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THE MEMORIAL QUADRANGLE AND THE HARKNESS MEMORIAL TOWER AT YALE

JAMES GAMBLE ROGERS, Architect

By William H. Goodyear. Curator of Fine Arts in the Brooklyn Museum. Yale, B. A. 1867; Honorary Yale M. A. 1904; Honorary Member of the Royal Academies of Venice and Milan; of the Architectural Associations of Rome and Edinburgh; of the Royal Institute of Architects of Ireland and of the Society of Architects of London; Corresponding Member of the American Institute of Architects.

WHEN the writer was a student at Yale during the years 1863-67 inclusive, the accommodations of the College dormitories (then confined to the "old brick row") were only sufficient for the housing of the Senior and Junior classes. The exceptional cases in which Sophomores or Freshmen of the class of 1867 had rooms in these dormitories were almost wholly confined to students who worked their way through college by doing janitor's work and by acting as class division monitors. In such cases the Faculty was able to repay these services by giving such students dormitory room rent free, as well as by the remission of the usual fees. The writer well remembers his own sense of deprivation and that of his classmates during the two years of waiting for rooms on the College Campus; for the democratic social life of a college can only be properly enjoyed when living in college buildings. The loss of about one-half the possible income from the rent of rooms in the case of the given class, must also be figured as a serious loss to the University.

Elihu Yale
Statue on Tower

What the exact facts and figures may have been during the years preceding and following those of the class of 1867 need not be gone into here. It is enough to say that in spite of manifold gifts and bequests in this direction and the construction of a considerable number of dormitories, following the destruction of the old brick row, Yale College has always suffered great loss of income and serious detriment to its col-

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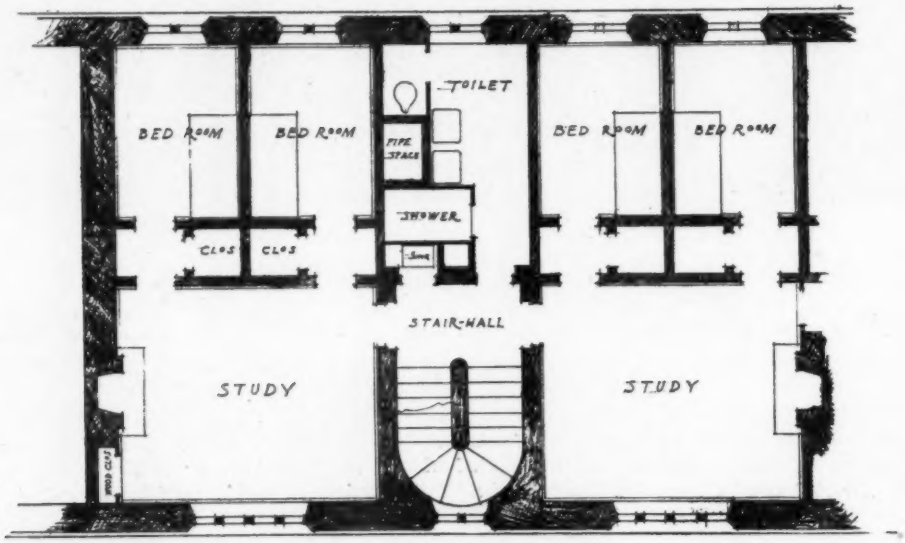
lege life since the years best known to the writer, through the lack of dormitory buildings.

In the year 1916 the Yale Faculty made known to the world that it lacked 502 campus rooms for the housing of the academic department students and this number may have represented considerably more than one-third of the entire number of college students at that date. Yale *College* (Academic) must be distinguished as regards these figures, from Yale *University*, which includes the great number of students in the Scientific School, besides those of the Schools of Divinity, Law, Medicine, Art and other post-graduate students.

In the same year (1916) died George William Harkness of the class of '83, born in Ohio in 1860; a man of lovable, sympathetic, and charitable character, the business manager and head of a family of considerable income, and one who had shown much generosity during his lifetime to the University of which he was a graduate. His mother, Mrs. Stephen V. Harkness, resolved to found a memorial to her son which should meet the needs of Yale College as then recently made known in the matter of the large number of students who could not be accommodated in Yale dormitories.

Her undertaking was not specified in terms of money or even in terms of the number of students to be cared for. It was to the effect that she would provide means to house *all the students* of Yale College lacking college rooms; to include not only the expense of a new dormitory Quadrangle, but also the cost of removing and rebuilding certain University buildings then standing on the only plot of ground available for the Quadrangle (including the University heating and power plant; the Peabody Museum; Herrick Hall, formerly the Commons and Gymnasium; the offices of the Graduate School; Pierson Hall (a dormitory) and some other offices. There was also a row of shops on Elm Street and a row of residences on Library and York Streets).

The site thus made available was the entire block (in the rear of the college dormitories, facing the Green), bounded on the south and north by Library and Elm Streets and bounded on the east and west by High and York Streets. The exterior dimensions of the Memorial Quadrangle are 357 feet on the south (Library St.), 356 feet on the north (Elm St.), 413 feet on the east (High St.), and 416 feet on the west (York St.). The Quadrangle contains about 1,100 rooms and accommodates approximately 650 students. The corner stone was laid on October 8, 1917. By the date when this article appears the Quadrangle will be fully occupied; and the Senior and Junior classes (Classes of 1922 and 1923) will be settled in their rooms. This domicile is obligatory on these classes.



Scheme of study, bed rooms and toilet, Memorial Quadrangle, Yale University

"When Mr. James Gamble Rogers appeared before the Yale Corporation Committee to submit his designs for the Memorial Quadrangle, he laid before them the type plan of a study with two single bedrooms"

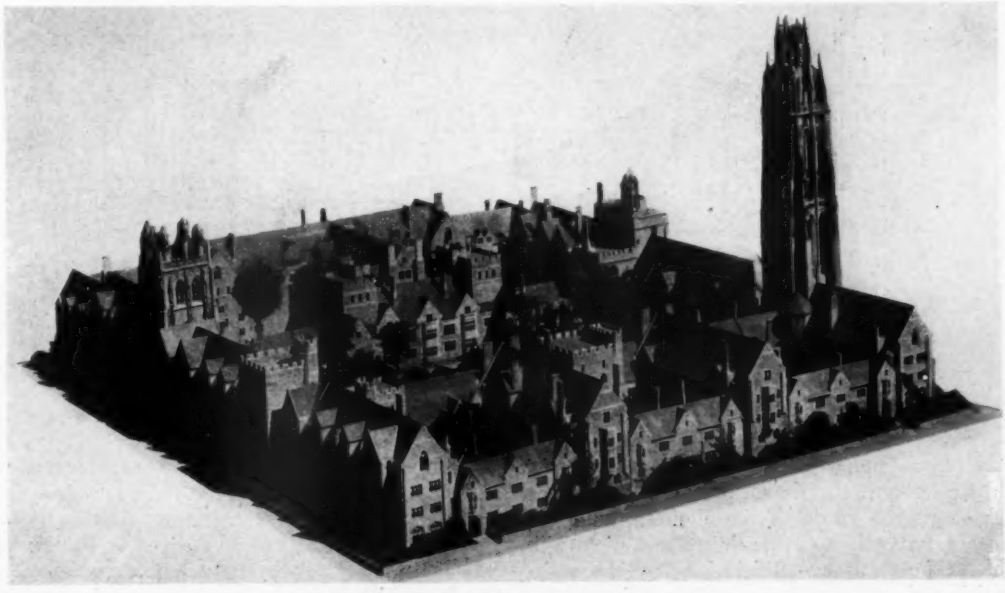
In spite of this very recent occupation, (the entire south side was occupied only a year ago) the lawns of the various courts are in perfect order; trees of considerable size (some dating before the present buildings) are found in the courts, bushes and greenery are seen in all directions and the exterior moat is covered with luxuriant vegetation. The landscape accessories and surroundings appear as though the buildings had been completed for many years. The setting of the gem is perfect.

II

WHEN Mr. James Gamble Rogers appeared before the Yale Corporation Committee on building plans to submit his design for the Memorial Quadrangle, his procedure was unique. What the Committee must have expected was a series of architectural elevations together with complete plans of the buildings proposed. What was laid before them was the type plan of a study with two single bedrooms: The logic of this proceding was perfect, although not exactly according to precedent. Given the need of a series of college residential buildings, what shall we consider as of greater importance, their façades or the comfort and daily life of the students who are to live in them, and how can plans be made for a series of residential college buildings unless the primary unit of a single suite of rooms be first considered and approved as to dimensions and arrangement?

Yale Men—1819-1890
Figures on the Harkness Memorial Tower

The excellent example of Mr. Rogers will be followed in arranging the matter of this paper and his typical unit suite of a study and two single bedrooms will be first described. The width of any building in the Quadrangle is, generally speaking, determined by the size of the type suite, with study windows on one side and bedroom windows on the other side; the combined width of two bedrooms being equal to the width of the study. The length of any building is generally conditioned by the space required for a pair of these suites, together with the stair-



Photograph of Plaster Model of Memorial Quadrangle

The variety of the various façades may be studied by reference to the above scale model. In the principal and largest court (Branford), the York Street and High Street sides are three stories high and the east to west sides are two stories high. The varying heights of the buildings in this Quadrangle give the greatest possible amount of sunlight in winter days.

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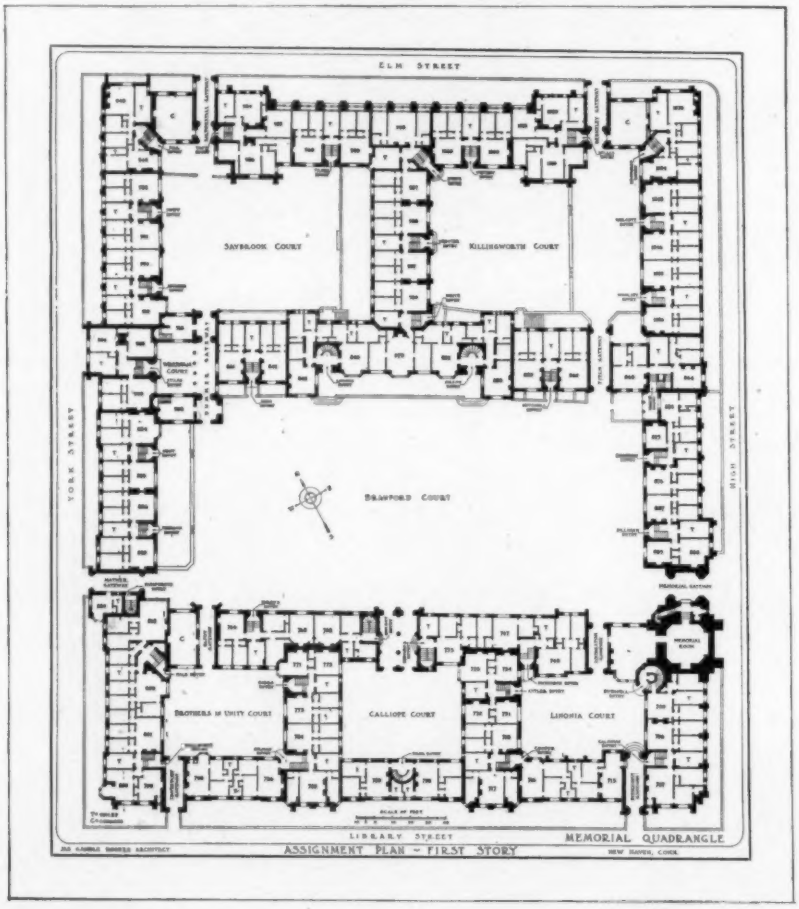
ways and the landing between the suites; including the lavatory which opens on the landing and which is designed for the use of four students. The length of the buildings is thus determined by the number of double suites with their separate entries and stairways, which its plan contains. The type suite is, however, varied in a number of instances, as suggested by desirable or necessary variations in the typical plan, so that there are some suites consisting of a study and three bedrooms, others with only one bedroom and study and some single rooms which are bedroom and study combined.

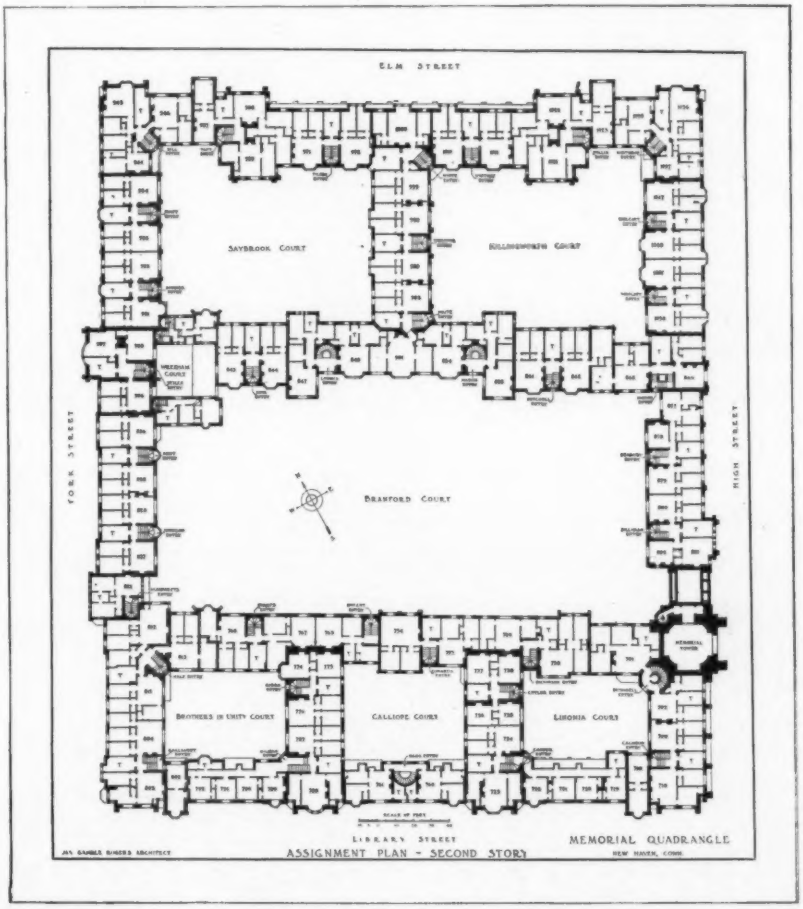
The floorings of these apartments are of oak planks of varying widths, fastened down with exposed wrought iron nails and with a surface finish which shows the marks of the plane, although the surface is smooth and the joints practically invisible. The walls are finished below the wainscot with a slate base, sloping outward in the bedrooms for convenience in cleaning. The wainscot, doors and trim are of oak, showing the natural grain and surface, but stained to represent the natural effect of age and then finished with wax. The walls above the wainscot are of rough textured plaster of a neutral tint in grey or brown. (There is no smooth or white plastering except in closets). The ceiling, finished like the walls, is supported by massive oak beams in visible construction. Every study has an open fireplace for wood fires but heat is also supplied by radiators resting on slate bases, which are operated by a double system. Two radiators are concealed by the window seat in the study. One of these is operated by a system which is designed for moderately cold weather. The second radiator belongs to a system which also operates a radiator in each of the single bedrooms and is intended for severe weather. The bedrooms are provided with sash ventilators, so that the windows may be closed when desired in cold weather. The windows are vertically double and are framed in iron with small leaded panes. They open outward on hinges at the sides with sliding rods which may be fastened at any required amount of opening. The closets have cement floors with a slate base and are raised one step above the floor-



ing of the rooms. The lighting system furnishes one electric light at the centre of the study ceiling with a variety of plugs for extensions to suit the convenience of the individual student. The appointments of the lavatories wholly discard bathtubs. They include a shower closet (with hot and cold water), two wash basins (for the typical pair of suites accommodating four students), and a toilet. Aside from the lavatory window, ventilation is provided through the shower closet into a shaft rising to the roof through the janitor's closet (which opens on the landing).

rounded corners at the angles and at the openings to the doors. Fire-escapes are provided in the interior construction by a system which carries each stairway to the attic, where it connects with the next adjacent stairway by a fire-proof passage. The interior construction of the buildings is of reinforced concrete.

The argument of this article now proceeds to point out that the astonishing and unique beauty of the exterior architecture of the Quadrangle which will occupy our attention later on, is the expression and result of a controlling idea which



The stairways and landings are built of American travertine and these stone stairways show a really astonishing lightness of construction. At the line where the tread touches the rise of the next step, the thickness is only two inches. This lightness of construction is carried out in the balusters, which are slender rods of wrought iron with a twisted design which comes to the square at top and bottom. The hand rail is of unpolished India teak. The walls of the stairways and stairway platforms are of rough textured brick, with

is equally apparent in the interior apartments. This controlling thought, aside from the remarkable grasp of utilitarian and practical problems, is to break utterly, frankly and openly with the appalling monotony so far generally found in institutional interiors with a standardized system of repeated units having the same dimensions and purpose.

In order to describe the care and thought which have been given to the ideal of individualizing and varying the type unit of a college student's

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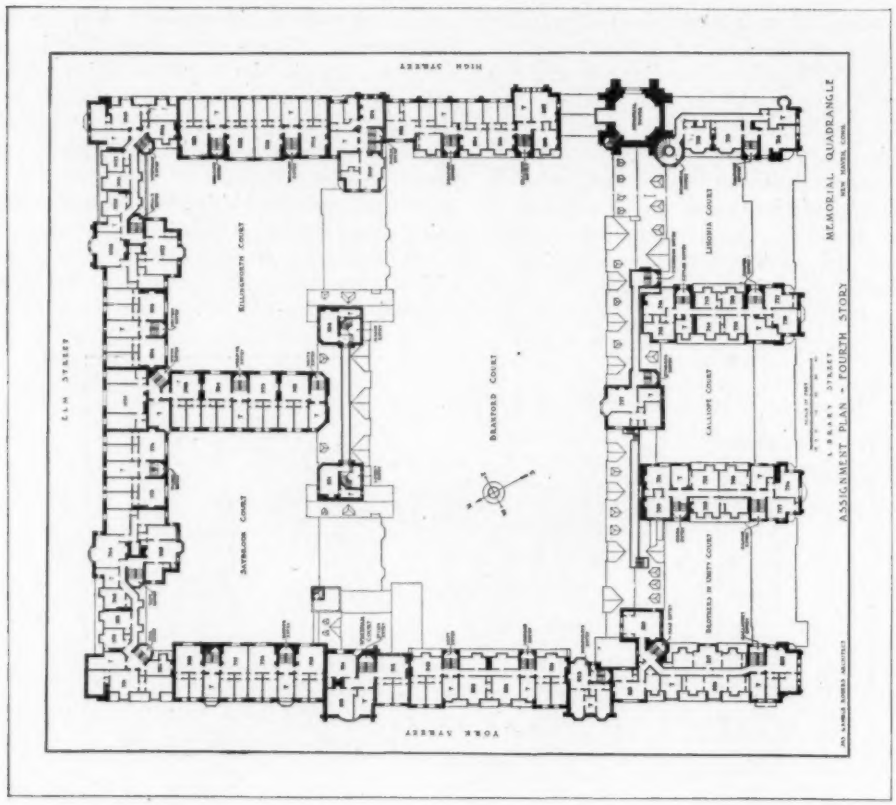
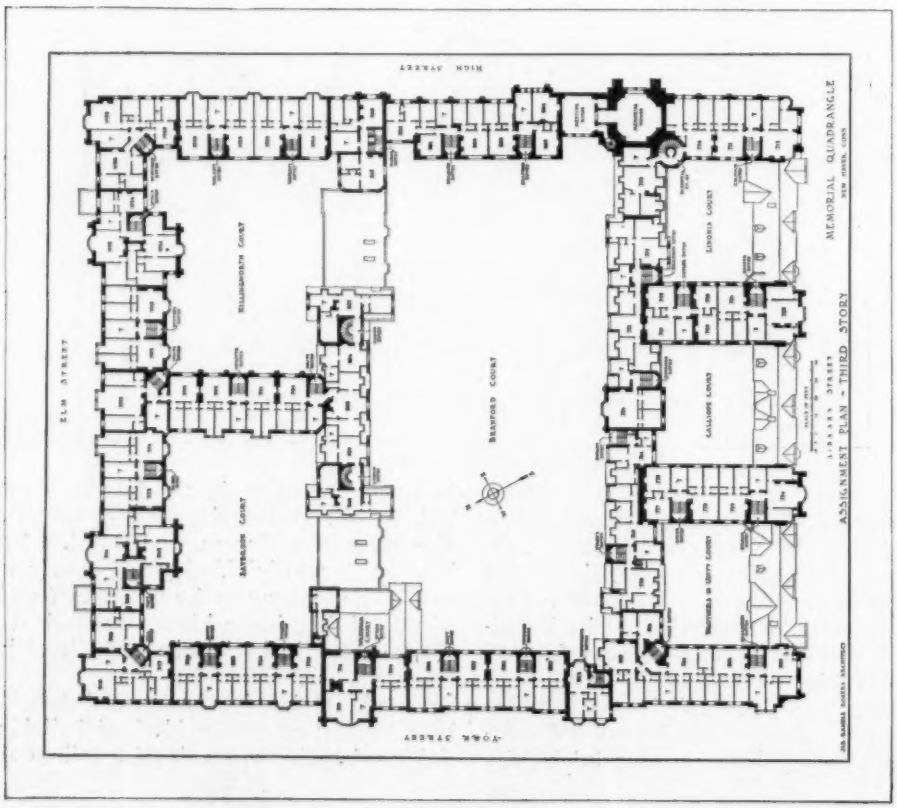
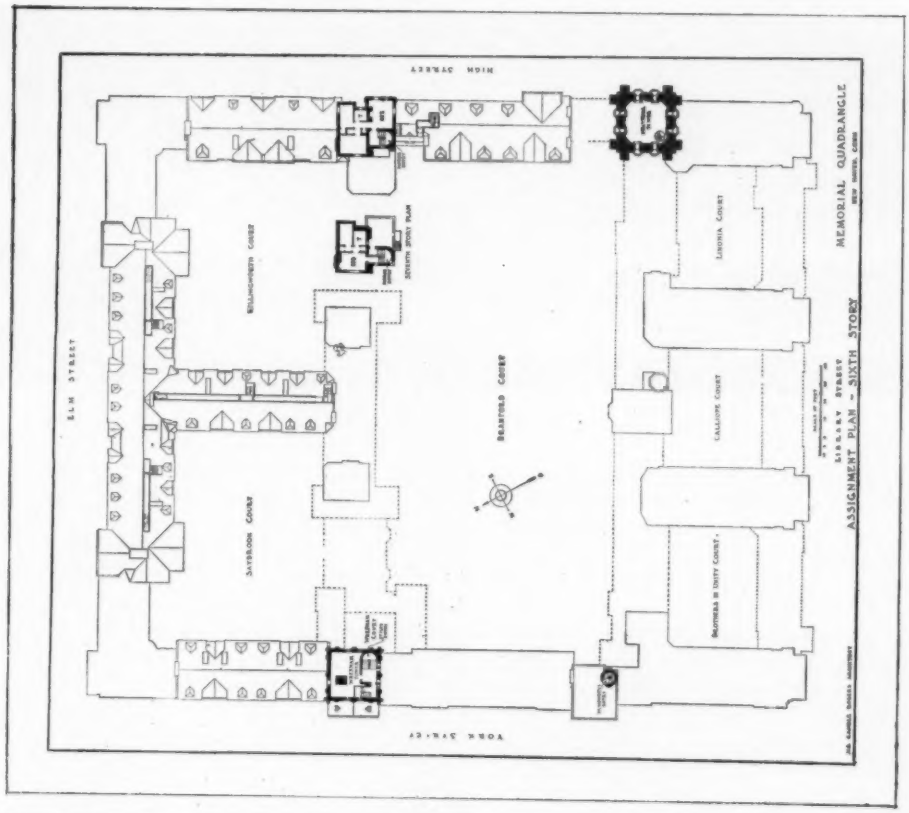




MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT


HIGH STREET
YORK STREET
ELM STREET
MEMORIAL QUADRANGLE
ASSIGNMENT PLAN - SIXTH STORY
BEINECKE LIBRARY
BEINECKE LIBRARY STREET
BEINECKE LIBRARY COURT
BEINECKE LIBRARY COURT
BEINECKE LIBRARY COURT

A cornice detail

apartment it has been first necessary to include a description of its practical and utilitarian features as well, and most especially so because many of these features combine utility with aesthetic quality and character; as found for instance in the rough finish of the walls, always more effective for color toning than a smooth plaster surface; as found in the visibility of the beams of the ceiling; as found in the visibility of the planing marks and exposed wrought iron nails, as a means to artistic finish in the oaken flooring; as found in concealing the radiators under the window seats; and as found in the rough textured brick walls of the stairway and landing which are far superior for color and texture to a plastered surface. The wrought iron balusters and unpolished teak rail of the stairway are another illustration. The use of a natural finish oak for the woodwork of the wainscots, doors, and trim; as distinct from the stain or color and smoother surface finish which is usually and necessarily found in woodwork of other material is also an aesthetic asset of supreme importance.

These features are of general importance but there are others which give a separate individuality to each apartment. It has been mentioned that every study has an open fireplace. In an apartment visited by the writer the fireplace was lined with American travertine but brick and iron are also used. Counting the oak mantel and oak trim there are five types of material used for the fireplace. By varying the combinations twenty-five different styles of fireplace are obtained, and these are used in adjacent and neighboring apartments. The practical result is a variety of appearance in contiguous apartments which appears to be universal for all. From the same point of view the plaster tint of the study walls shows five different tones of grey and brown for any five adjacent apartments, all of which are consequently dissimilar in this particular. An additional touch of individuality is obtained by the universal but modest and appropriate use of wood carving. The interior oaken spandrels of a study door noticed by the writer, contained reliefs, of excellent design and execution, representing on opposite sides, the Saviour and the Tempter, suggesting probably the choice between good and evil which lies open to the student. The corbels of the ceiling timbers terminated in grotesque human heads of an execution and conception equal to the best medieval work. A relief medallion portrait of some college worthy appeared on the oaken trim near the window. Finally every study window in the Quadrangle has one of its small panes decorated with a picture or device in color suggestive of college associations or college history, and this picture differs in every instance from its fellows.

Sketch of Library Street façade, showing the Moat

These various touches of individual decorative interest tend to humanize the student's life, to raise his plane of thought, and to stimulate his pride in his surroundings. Outsiders may not wholly realize the keen interest which the average college student takes in decorative accessories which illustrate, and relate to his college life. Far distant be the thought that too much has been

done for him in the Quadrangle in the line of decorative art. Although much thought and much expense must have been devoted to these details, there is no taint of luxury and no visible suggestion of a lavish outlay of money in these directions. Good taste, common sense, simplicity and the economic use of constructive material and constructive necessity for decorative purposes characterize the interiors of the Quadrangle. From a practical point of view the writer cannot forbear the suggestion that philanthropists who are interested in apartment houses designed with a limited number of rooms for people of moderate means ought to visit these buildings. Without knowing what Mr. Rogers has hitherto done in this direction it may be hoped that his talents will be widely employed for this purpose in the future. If not, the world, philanthropy and good architectural art, not to mention distressed tenants who are in search of moderate rents, will be the losers.

Aside from the Memorial Hall in the first story of the Harkness Memorial Tower all the rooms in the Quadrangle have a residential character and purpose. Outside of the studies and bedrooms there are four rooms of moderate size, located near the outer angles of the entire group of buildings. These are called "Commons" rooms but are not used for the purpose usually suggested by that word. They are lounging rooms, fitted up with the same attention to comfort and utility which is found in the students' apartments. and decorated with occasional relief carvings in the oaken woodwork which illustrate the life and history of the College.

III

THE outer dimensions and boundaries of the Yale Memorial Quadrangle have been mentioned. It is dominated by the most beautiful tower in modern architecture and is laid out with consummate taste for picturesque effect in matters of landscape accessories. The exterior Quad-

rangle encloses six interior courts of which the largest and central one is an oblong approximately measuring 260 feet by 110 feet, reaching from the High Street to the York Street interior façades. Its beautiful lawn is dotted with trees, shrubs, and bushes and is unbroken by crossing paths.

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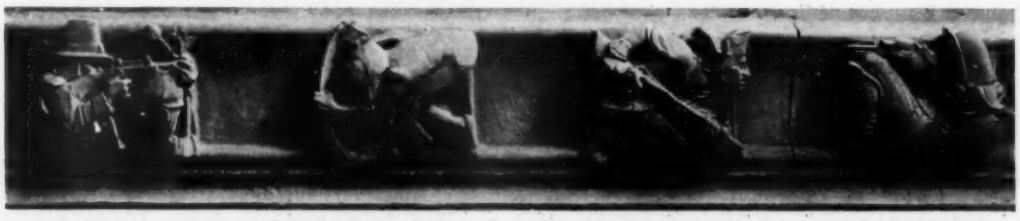
This interior quadrangle is not conceived as an architectural unit of uniform detail and appearance, but rather as a court formed and bounded by contiguous buildings of varying and separate designs. The unifying features are the general resemblances of English secular Gothic and the character of the masonry, which is the most remarkable and the most beautiful so far known to the modern world, and presently to be described. The same appearance of variety and diversity holds of the remaining courts, three on the south and two on the west of Branford Court. None of them are designed as courts; all of them are open spaces surrounded by buildings of varied design. (The courts on the south, where there are three, are also consequently of different and smaller size than those on the north, where there are two, and this again contributes to variety of appearance in the buildings which surround them). It follows that the four exterior façades of the Quadrangle are also of different design. The infinite variety thus obtained has been carried into all the details to be subsequently described. Institutional uniformity and academic uniformity have been thrown to the winds (the latter in two senses). It remains to be added that no taint of eccentricity, of *art nouveau,* or of manufactured picturesque effect, is to be found in any of these buildings so happily and harmoniously joined together. All of them are sober and serious designs based on English secular Gothic. The character of the plans is attested by their relation to the type unit plan of study and bedrooms which has already been described. It follows from what has been said on that subject that there is not a ground plan in the whole Memorial Quadrangle which has been designed for a manufactured picturesque effect at the expense of interior utility.

Northern and Southern Soldiers—Harkness Tower

We are thus led to recur to the fact that the style followed in the Quadrangle is English secular Gothic. It is said that the Corporation Committee on building plans recommended this style to Mr. Rogers. It must have been exceedingly grateful to him to be recommended to do what he wanted to; always supposing that he wanted to do what he actually did and this a fair supposition. That Mr. Rogers can design successfully in Renaissance is attested by the New Haven Post Office, but results in the Quadrangle show that this style would have been highly inadvisable there. Bonaparte long since told us that the style is the man. (*"Le style, c'est l'homme"*). He was speaking of literature but it is eminently true of the Quadrangle and in more than one sense. To have designed this Quadrangle in Renaissance would have robbed the architect of his big roofs, of his massive walls, with their marvelous broken colors, of his surfaces unfretted by projected pediments and Classic Orders, and of his massing and distribution of shadows in the window openings. Above all it would have robbed him of his immortal tower. To discard all rubbish about "correct styles," to design with a free hand, to use the building materials as nature gives them with their native natural surface, to be indifferent whether a window head is flat or arched (as far as style is concerned), and to be able to compose the shadow effects of these window openings with absolute freedom from classic rules and formulas—all this is to design in English secular Gothic, as understood by Mr. Rogers.

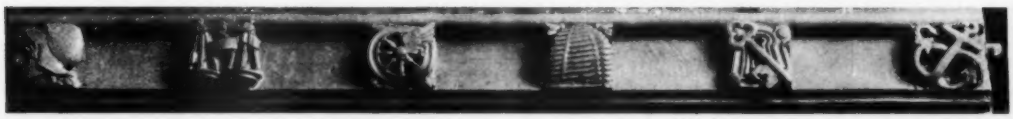
Jonathan Edwards

The infinite variety of these various façades, thirty-two in number if the writer is not mistaken, is controlled, however, by system. The



Colonist Indian Colonial Soldier British Soldier

Bosses in cornice typifying early American Wars —Harkness Tower



Wisdom Justice Fortune Industry Security Hope

Plaster Model for Soffits of Beams

south to north buildings facing York and High Streets, are one story higher than the highest east to west buildings, excepting those on the Elm Street side. Thus, in the principal and largest court (Branford) the York Street and High Street sides are three stories high and the east to west sides are two stories high. As a matter of vistas this is obviously an advantage. To make the long sides of the oblong lower and the ends of the oblong higher, is to construct very imposing effects of distant dimension for the entering spectator who comes into Branford Court, by the Memorial Gateway or by any gateway on the street sides, not to speak of the various entries from the courts on the east and west.

The World War—Tower

The deeper method in this madness is to construct courts having the greatest possible amount of sunlight in winter days and this, of course, is achieved by the lower heights of the interior east to west façades for the north side of Branford, and the north sides of Saybrook and Killingworth Courts. It must be remembered that the problem is to house approximately six hundred and fifty students on a given area and obviously much sunlight in the courts will be sacrificed if all the buildings are of uniform height. Following this principle the Library Street façade, facing south, is the lowest in its lower divisions of all the main sides of the Quadrangle and the Elm Street façade on the north side is higher than the highest exterior south to north sides (four stories) because there is nothing gained by letting sunlight into Elm Street. This system also explains why the total difference in the height of the east to west façades is from *one story* on the interior north sides of the three courts next to the Library Street side to *four stories* on both sides of the Elm Street façade. These three courts; Linonia, Calliope, and Brothers in Unity, as the smallest of all the courts, are most in need of sunlight in winter on their north sides. As a result of the variations described it is said that the sun falls at midday in winter within six feet of the north walls of these courts. On the other hand the three divisions of the Library Street façade (on the street side) which correspond to the north sides of these courts are two stories at their lowest height. Thus the same construction has two stories on the south and one on the north; the difference in height being taken up on the north sides by a low pitched but much wider roof. On the other hand the middle east to west buildings of these courts, separating Linonia from Calliope and separating Calliope from Brothers in Unity are three stories high, and are carried as constructive units into and through the Library Street Front, where they appear on its exterior as gabled three story projections with an additional dormer in the gable. The west side of Brothers in Unity Court and the east side of Linonia Court have the three-story height which is found on the York Street and High Street sides of the Quadrangle. All this may be perplexing in verbal description, but the statement that much sunlight in winter has been obtained for the north sides of the small courts on the Library Street side of the Quadrangle is unimpeachable. The farther statement that a delightful and infinite variety of architectural effect has been obtained by commonsense and conscientious attention to the comfort and welfare of the students in the matter of winter

Detail of front of a Window Seat

Athletics. The Crew
Harkness Tower

sunlight is also veracious.

On account of the relative seclusion of Library Street as contracted with the bustling life of Elm Street, it had also occurred to the architect to give the courts of the southern Quadrangle side a more intimate and more secluded and cloistered character. Hence their smaller dimensions and other phases of their design which appear in the illustrations. Hence also the appropriateness of the low proportions of the one story elevations on their north sides.

IT is difficult to realize that the most vivacious and colorful masonry of modern time has been built of granite. One is disposed to think of granite as generally of a pepper and salt or leaden grey color, worked down to a smooth surface and frequently polished for certain building uses. Granite is, of course, widely used for mausoleums and tombstones. Its qualities are supposed to be solidity, strength and durability in the matter of weathering (witness the granite temples of Egypt, as compared with the Egyptian temples of sandstone). We do not think of it as a building material of bright and cheerful color. That is because we may possibly not know about the Plymouth quarries of East Weymouth, Massachusetts. Mr. Rogers found at these quarries exactly the stone to suit his purpose and it was accordingly selected.

Stone Model of detail in a Commons

The granite masonry of the Quadrangle is not smoothed or tooled on the outer surface. The faces of the blocks show the uneven rough texture of the natural stone as it comes from the quarry. Add to this departure from precedent another; the blocks are of irregular sizes and are set in thick mortar without reference to regular courses; whereas granite, as usually known, is set with close joints and with no visible cement or mortar, in regular courses. As to color the general color effect of the Quadrangle masonry appeared to the writer as a warm grey, shot with irregular and broken effects of tawny yellow and deep reddish brown.

The Plymouth quarry stone is described by an expert as being a "seam-faced" granite. Seapage into the seams of iron and sulphur derived from earth and mould has produced the stains. These have saturated the blocks to depths reaching from half an inch to eight or ten inches and sometimes penetrating its entire thickness.

"Literateur"
Harkness Tower

The setting of masonry of such bright and varied colors must naturally be directed by an artist such as Mr. Rogers has proved himself to be. The blocks of the Harkness Memorial Tower for instance start at the base with the roughest surface and the darkest browns and yellows, gradually toning over to the lighter tints by insensible graduations, the lightest colors being used toward the summit, a light colored sandstone being also employed in the upper stories, at first mixed with the granite and then alone. The gradual transition from dark to lighter tones of granite in the vertical direction, has also been generally followed in the walls of the Quadrangle. In both cases the effect is one of strength and stability at the base, and lighter weight above. As regards variations of color in the given granite it may be mentioned that the light grey Wrexham Tower is so much lighter in tone than the neighboring buildings as to suggest the use of a different masonry. This effect is due to a careful choice of the granite blocks as regards tone and this individual selection of the masonry units for effect of color and tone has been the rule throughout the Quadrangle. It goes without saying that in no other modern buildings have such persistent care and thought been devoted to the texture and broken color effects of the masonry. It need hardly be mentioned that an elementary rule of decorative art teaches that a flat tint or uniform surface of color is always inferior to broken color. This is also the reason why rough texture, which involves a greater vari-

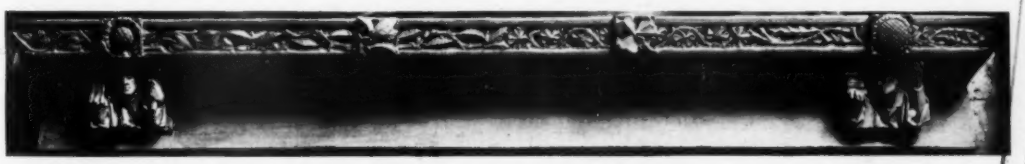
ety of lights and shadows and consequently a greater variety of color tones, is generally superior to smooth or polished surface in any given material.

Aside from the granite masonry many remarkable instances of the persistent effort to break up and vary the monotony of uniform surface and uniform color and the monotony of *regular masonry,* are found in the three small courts of the south side of the Quadrangle. In Linonia Court courses of brick and granite have been mixed together in horizontally broken bands of irregular widths and the low-toned soft pink of the brick work is exceptionally beautiful. On enquiry it appeared that no such brick is, or can be, manufactured. The tone is obtained by using old bricks from buildings which have been torn down and subjecting them to sandblast. Fine effects of texture and color are also obtained in this court and in its gateways by irregular courses of brick laid with careful carelessness in thick mortar. In Calliope Court use is made of the Boisé sandstone from Idaho. Delicate variations of color are obtained by surfaces which show the cuts of a saw which is operated with a mixture of steel shot and sandstone fragments. In Brothers in Unity Court seven sizes and five colors of new pressed brick are mixed with irregular courses of sandstone and limestone, and the colors of the brick work have been toned down by the sandblast.

The "Mystery Ship," Stone over Mantel

Aside from these courts the masonry surface is Plymouth Quarry granite throughout the Quadrangle façades. Briar Hill sandstone from Ohio (streaked with iron rust) has been largely used for trim and grey Indiana limestone has also been used for this purpose. Berkeley Gateway, a passage leading from Killingworth Court to Elm Street, is vaulted with old brick formerly used for street pavements in New Haven and there are many variations of arrangement and treatment in the vaultings of the passages, mostly of granite. The sides of these passages also display an infinite variety of invention in the composition of the masonry patterns.

From the foregoing account it appears that ordinary photographs can never give a correct impression of these buildings. Lumière photographs on transparent glass, showing the actual colors, will doubtless be widely used, for the benefit of those who cannot visit the buildings. As to pictures in color they can hardly be attempted even by the most gifted artists. A watercolor by Sargent might deal with some small portion of a given façade or court. The painters in oil whose temperaments would react most readily to the color schemes of Mr. Rogers are Monet, Sisley and Monticelli. Monet is the only artist who could attempt the changing and vibrating color, the evanescent feathery grace and the etherial lightness of the Harkness Memorial Tower (220 feet in height). As regards color schemes those of Sisley find a close analogy in the walls of the Quadrangle and Monticelli would have highly appreciated its texture and warm broken colors.



Detail of Mantel Top

LIBRARY
THE DETROIT EDISON CO.
OCT 31 1921

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The roofs of the Quadrangle are of large dimensions and are an asset of great importance to its architectural effect. Once more the unfailing preference of the architect for broken color asserts itself, but the contrast of tone with the walls is emphatic and important. At a distance the roofs appear as a dark spotted grey. At close range the tiles show colors of green, slate, brown, and dark grey, blended with agreeable effect. They are so arranged, in medieval fashion, that they

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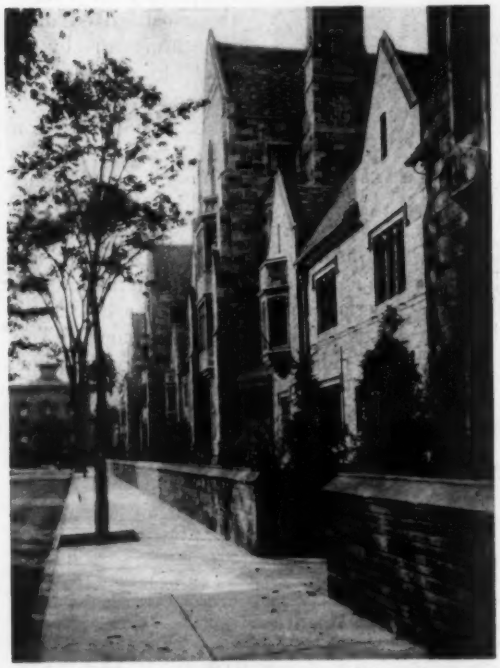
have a wider exposure of surface and greater thickness at the eaves, with a gradual diminution of exposed surface and thickness toward the ridge. The surface exposure of the tiles diminishes from eight and one-half inches to four and one-half inches and the thickness decreases from one and one-eighth inches to five-eighths of an inch. The result is an optical perspective illusion of increased distance between eaves and ridge, together with that charm of effect which always attends slight variations of dimensions in apparently corresponding units of design. The tiles are originally red, then subjected to reglazing and refiring in the quoted colors, a method which is the invention of Mr. Rogers. Before the first baking their surfaces are roughened and corrugated by hand. The purpose of this procedure is to retain the dust so that it may offer a soil which will promote the growth of lichens and moss, and thus improve the toning of the roofs.

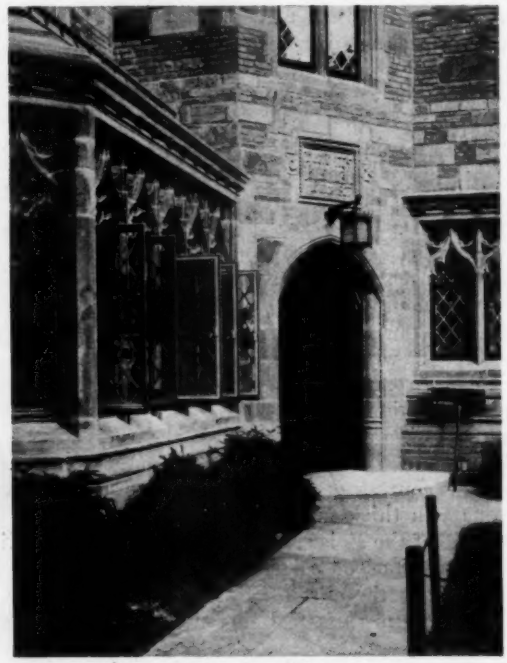


An exterior view showing moat wall on Library Street,

THE Memorial Quadrangle is a memorial in more than one sense; not only of the man whose name is specifically mentioned only in connection with the Harkness Memorial Tower, but also of the history of Yale College. And this thought has been so abundantly and consistently carried out as to add one more element of varied effect and of food for thought to this wonderful creation.

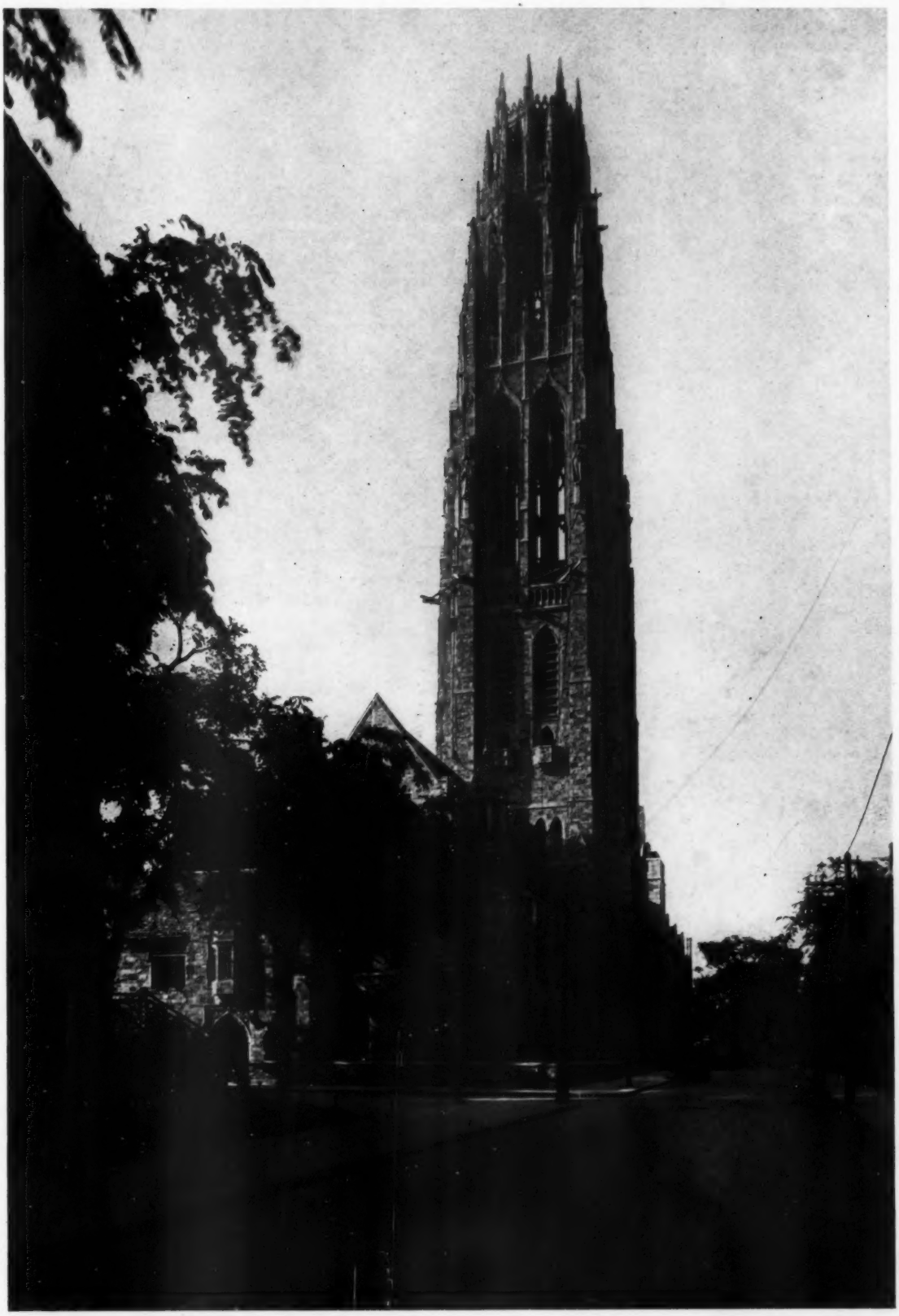
The naming of the various courts after the three localities with which Yale history is first connected and after the three great public debating societies which flourished (two of them at least) down to the third quarter of the last century, is only the beginning of an elaborate monumental revival of the historic associations of the University and of the memory of its many illustrious graduates.

Yale College is so named after Elihu Yale, a rich India merchant whose donation in the first decade of the eighteenth century of five hundred pounds' worth of goods was the first substantial contribution to the support of the College. He is buried near the tower of St. Giles Church at



A corner in one of the courts

Wrexham in Wales. Hence the free copy of the tower of this church at the angle of Branford Court, diagonally opposite to the Harkness Memorial Tower. It is by no means, however, a purely decorative appendage of the Quadrangle. Its five lower stories are devoted to students' rooms and its louvres conceal one of the two tanks which furnish the water supply of the Quadrangle. (Another tank is concealed behind the louvres of the Harkness Memorial Tower). Statues of heroic size of eight leading Yale worthies are placed on the Harkness tower at about half the height of its belfry; they represent Jonathan Edwards, Elihu Yale, Eli Whitney, Samuel F. B. Morse, John C. Calhoun, James Fenimore Cooper, Noah Webster and Nathan Hale. The gateways and entries of the various courts are not only named after distinguished benefactors and famous graduates, but they also carry inscriptions giving names, dates, and a brief record of their contributions or serv-



HARKNESS MEMORIAL TOWER FROM YORK STREET, NEAR CHAPEL, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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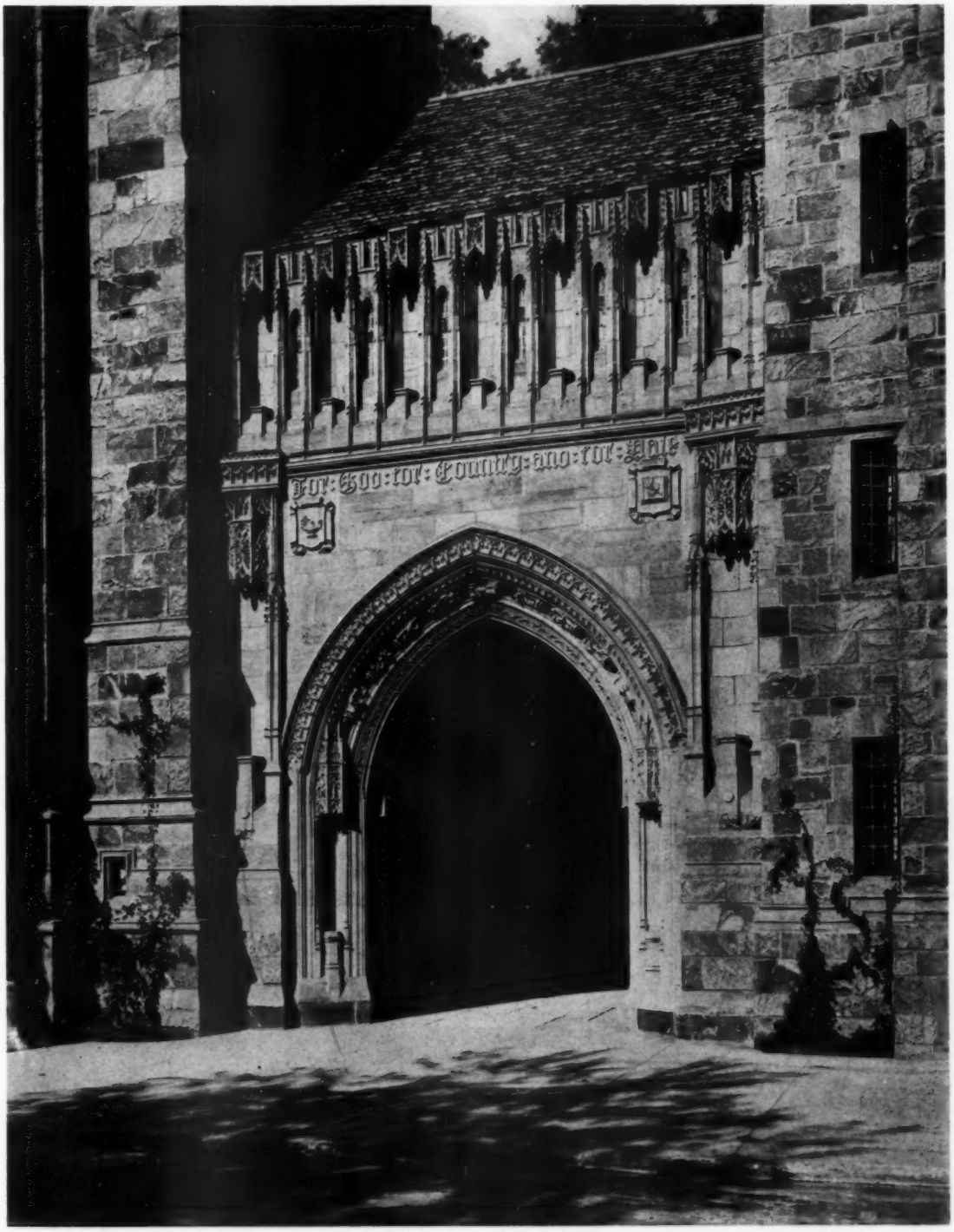

MEMORIAL GATEWAY, LOOKING IN

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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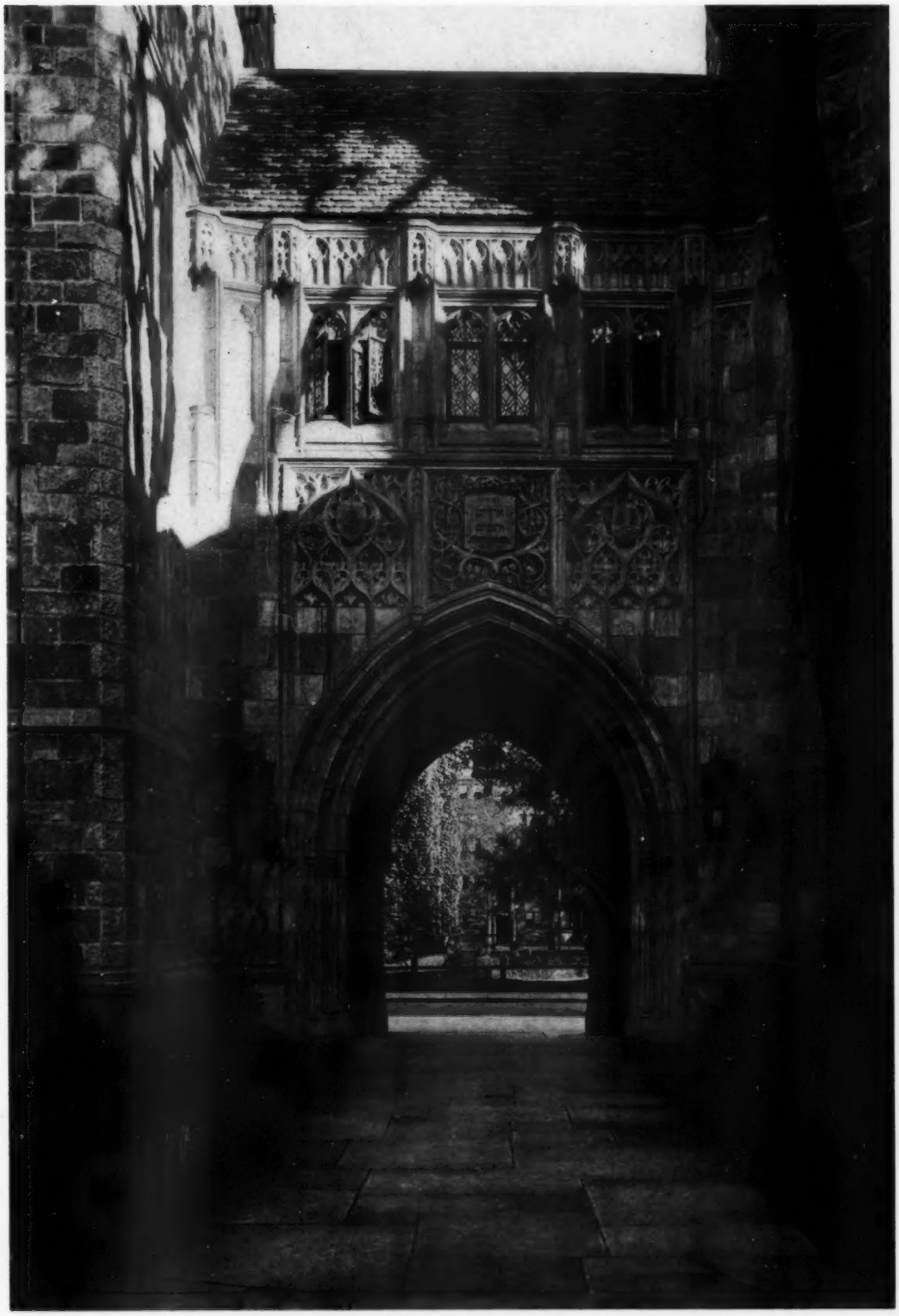

MEMORIAL GATEWAY, FROM BRANFORD COURT

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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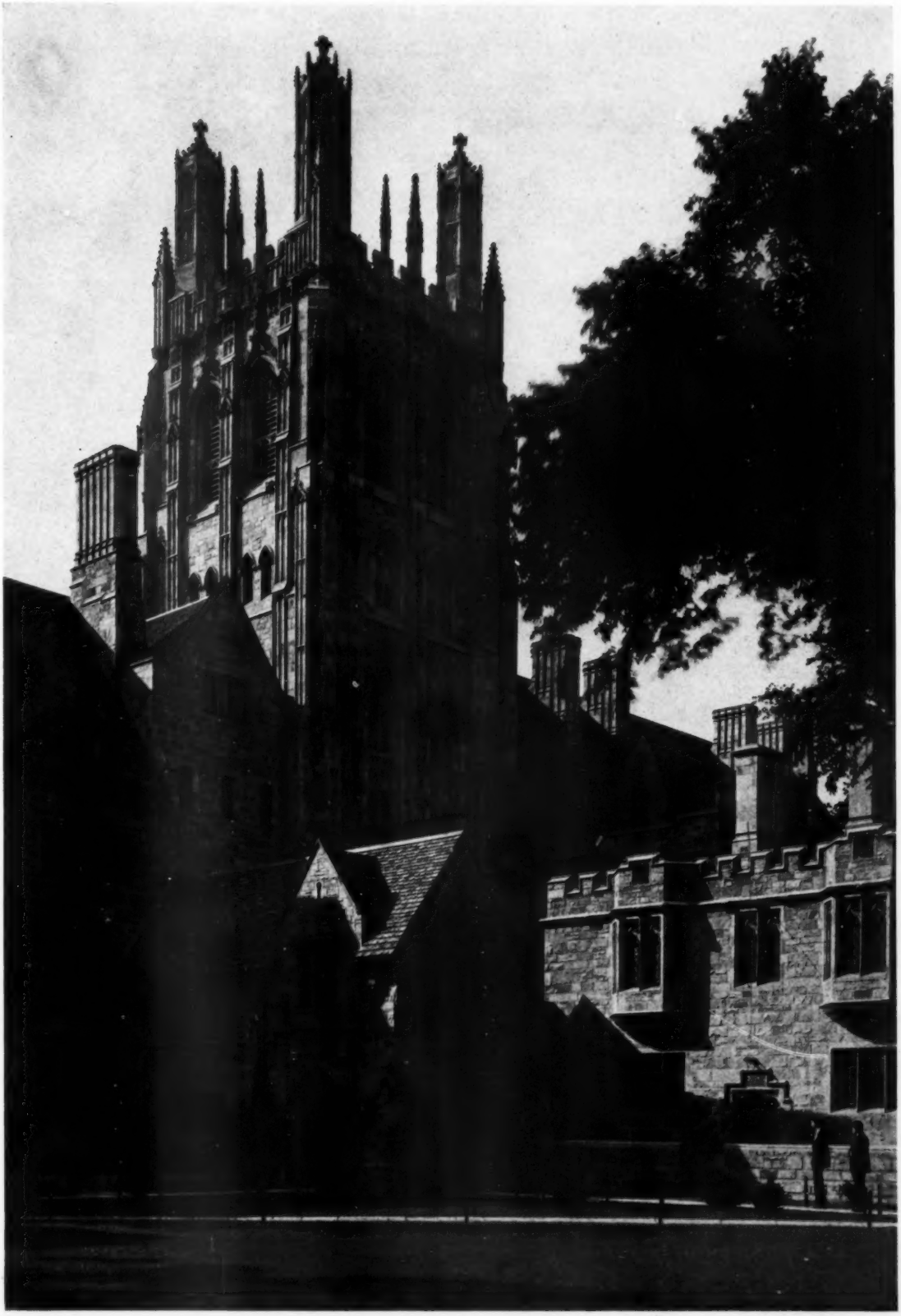

WREXHAM TOWER, FROM BRANFORD COURT

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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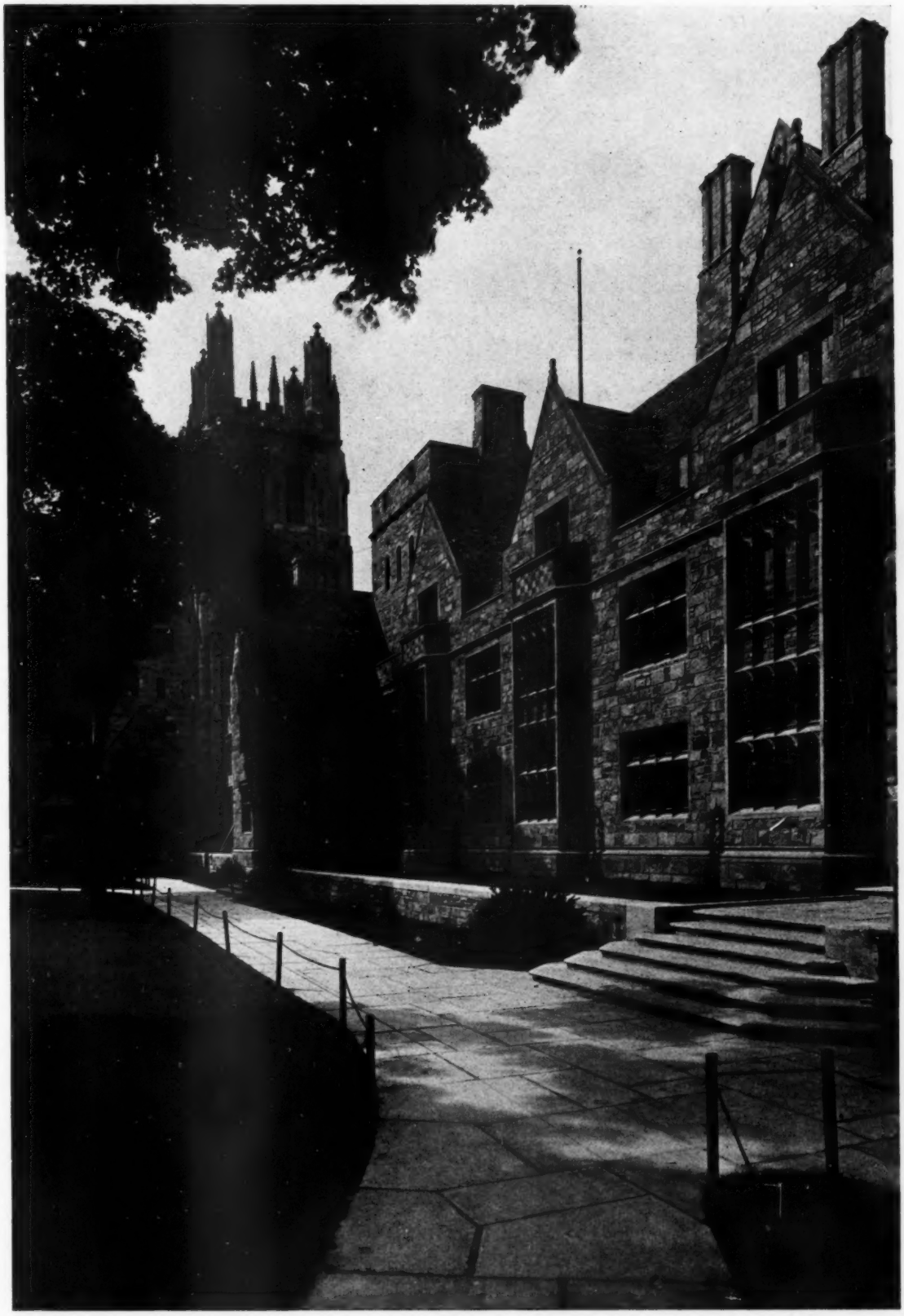
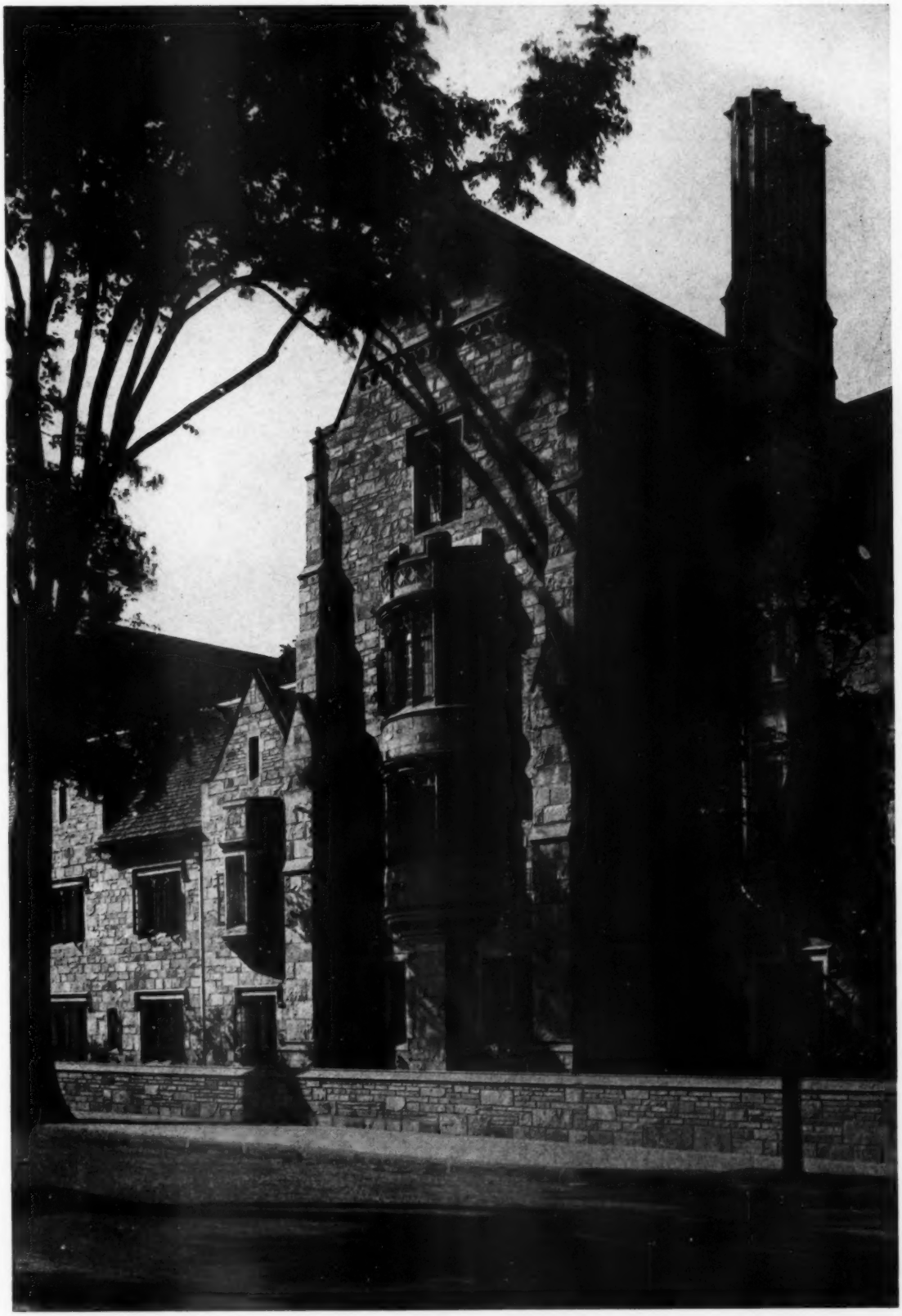


WREXHAM TOWER, FROM SILLIMAN ENTRY

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT



DETAIL OF FACADE ON LIBRARY STREET, SHOWING MOAT WALL

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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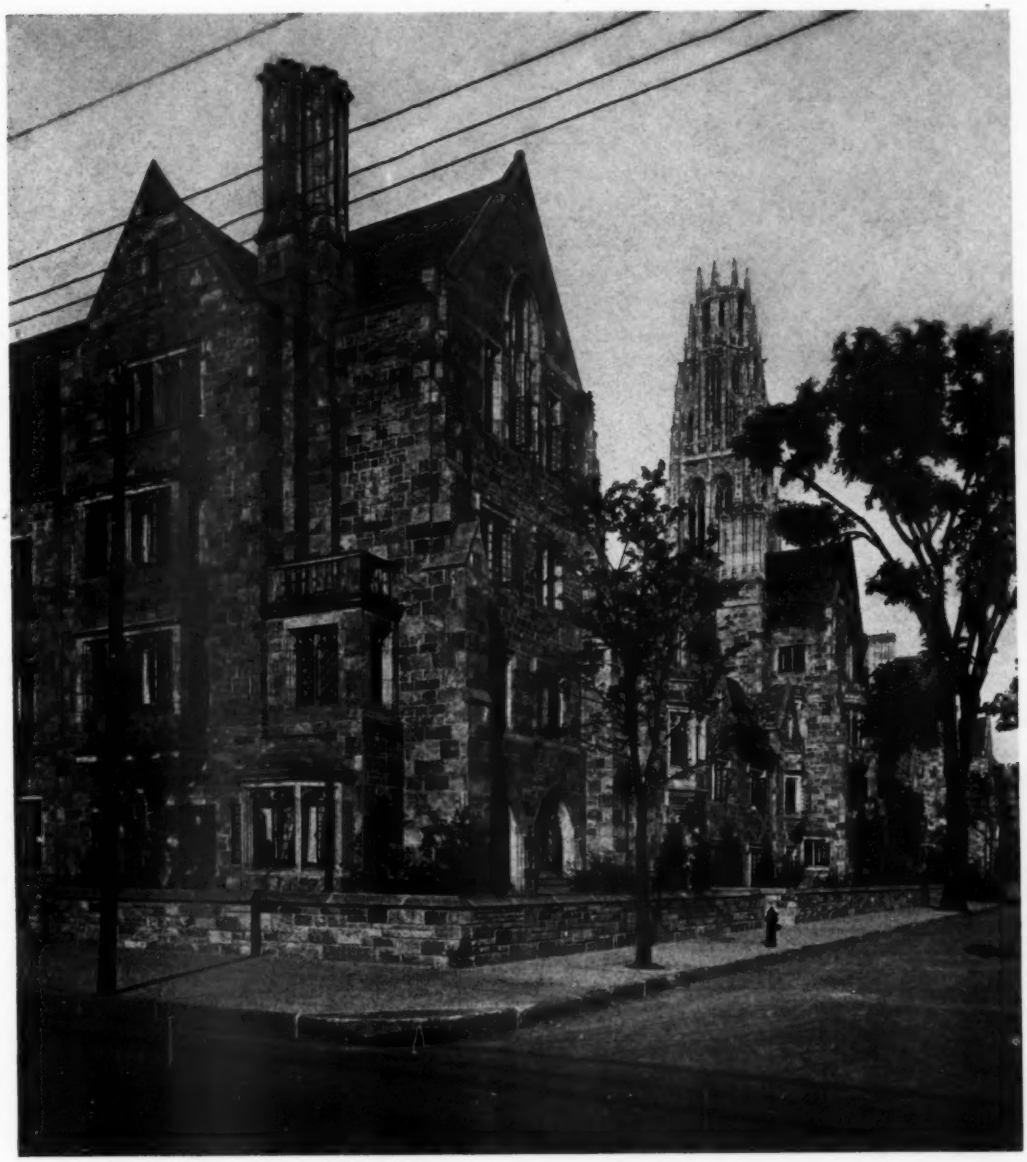
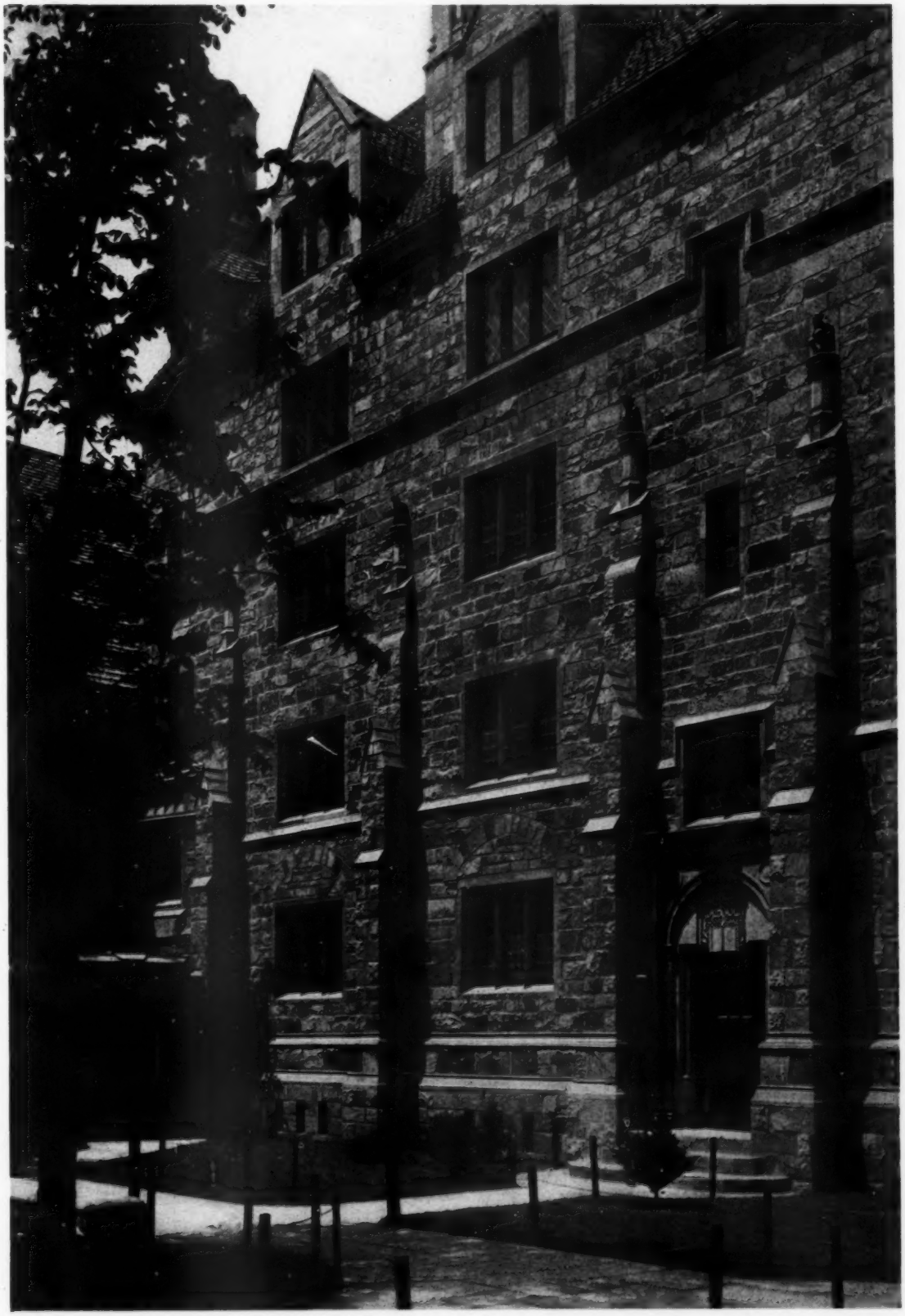


LOOKING TOWARD LIBRARY AND YORK STREETS

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT



NOAH WEBSTER ENTRY, KILLINGWORTH COURT

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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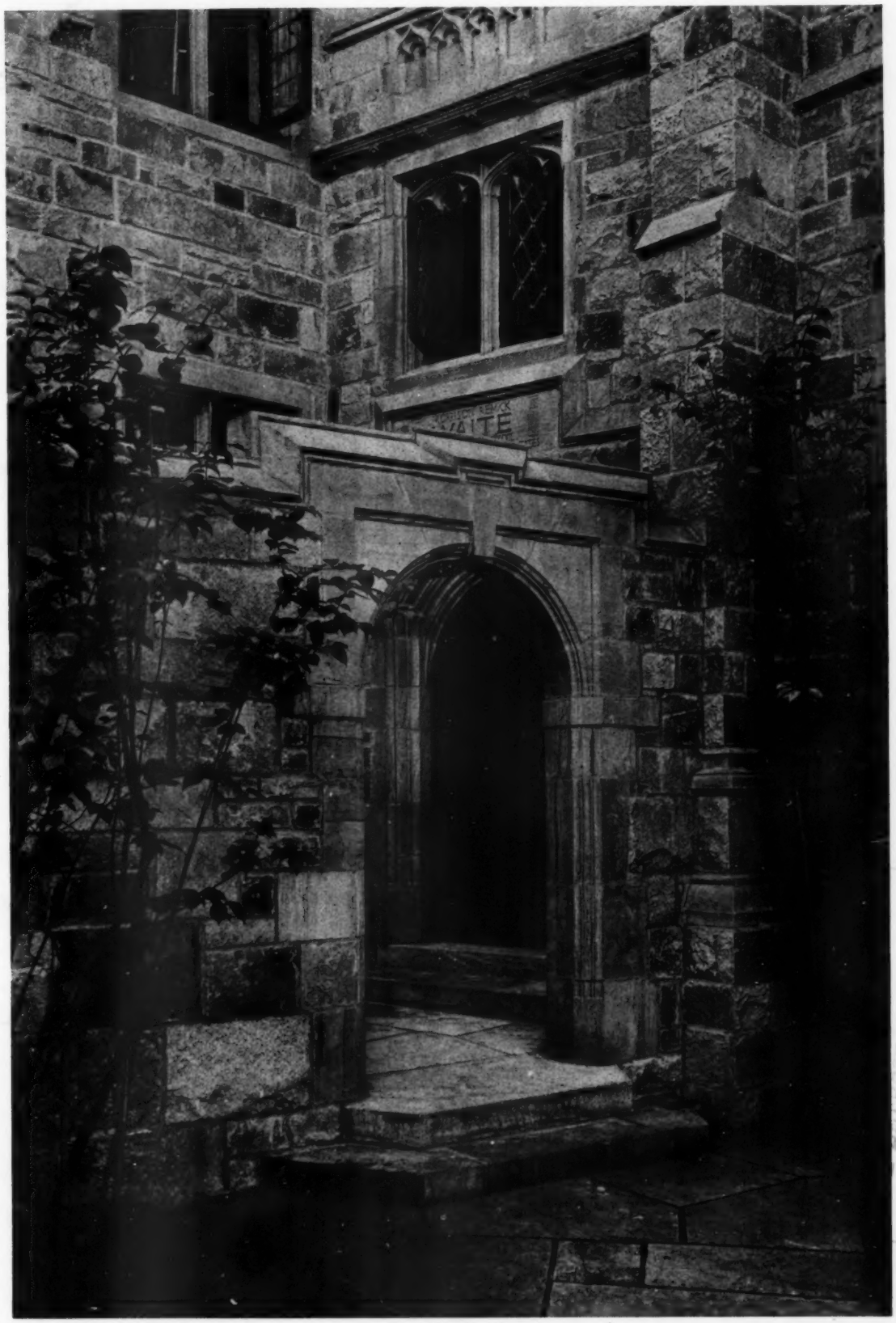

WAITE ENTRY

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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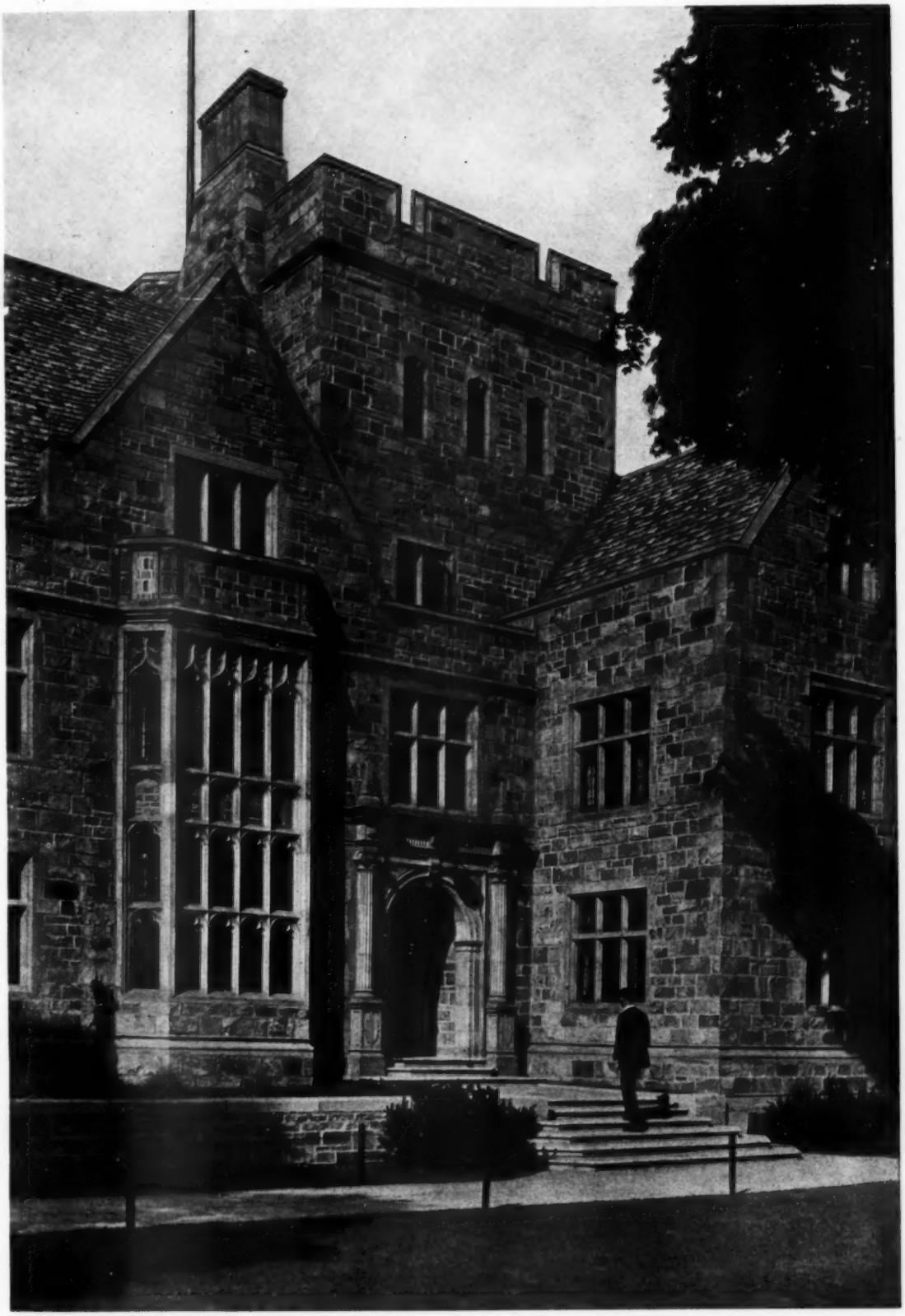

MASON ENTRY

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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DAVENPORT GATEWAY

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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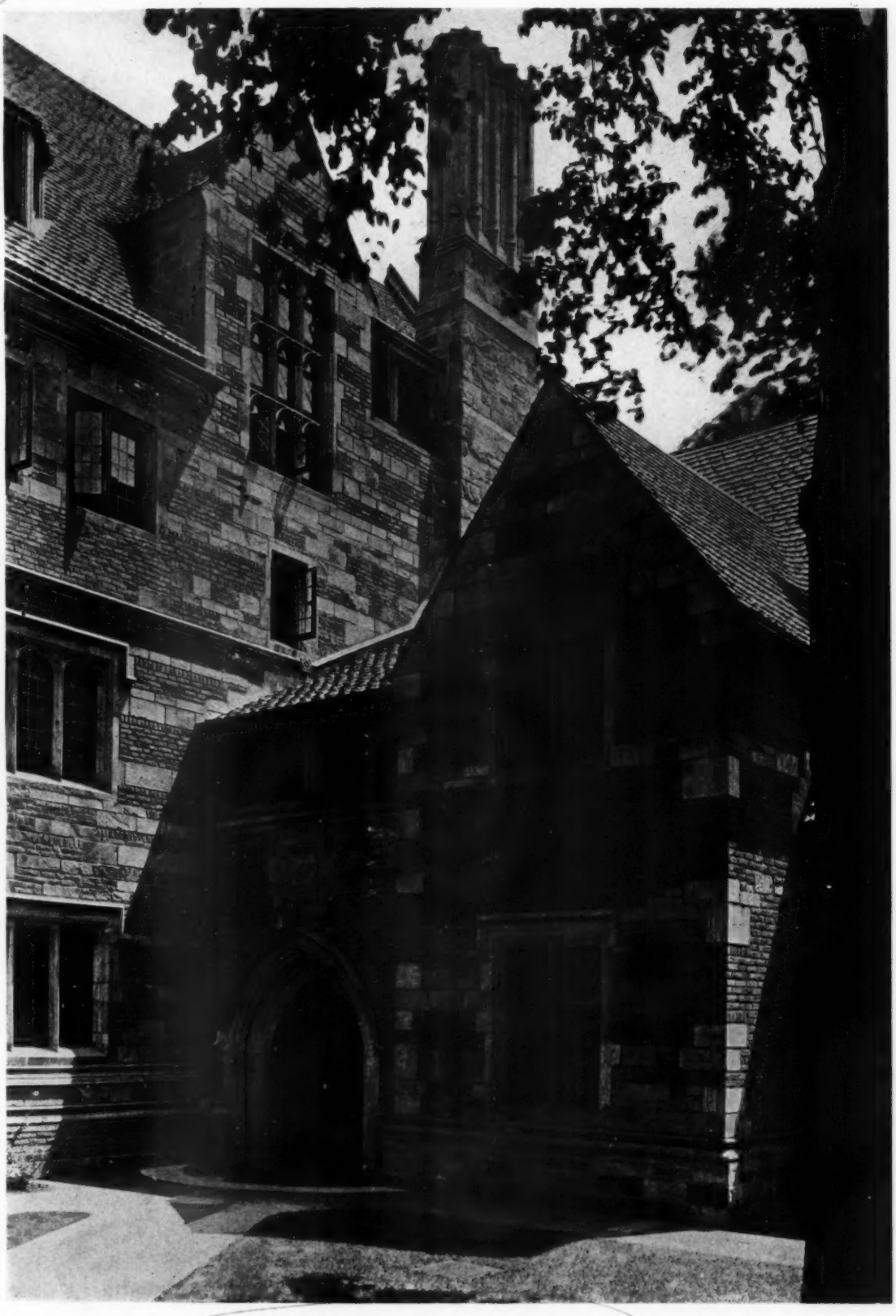


PIERPONT GATEWAY FROM LINONIA COURT

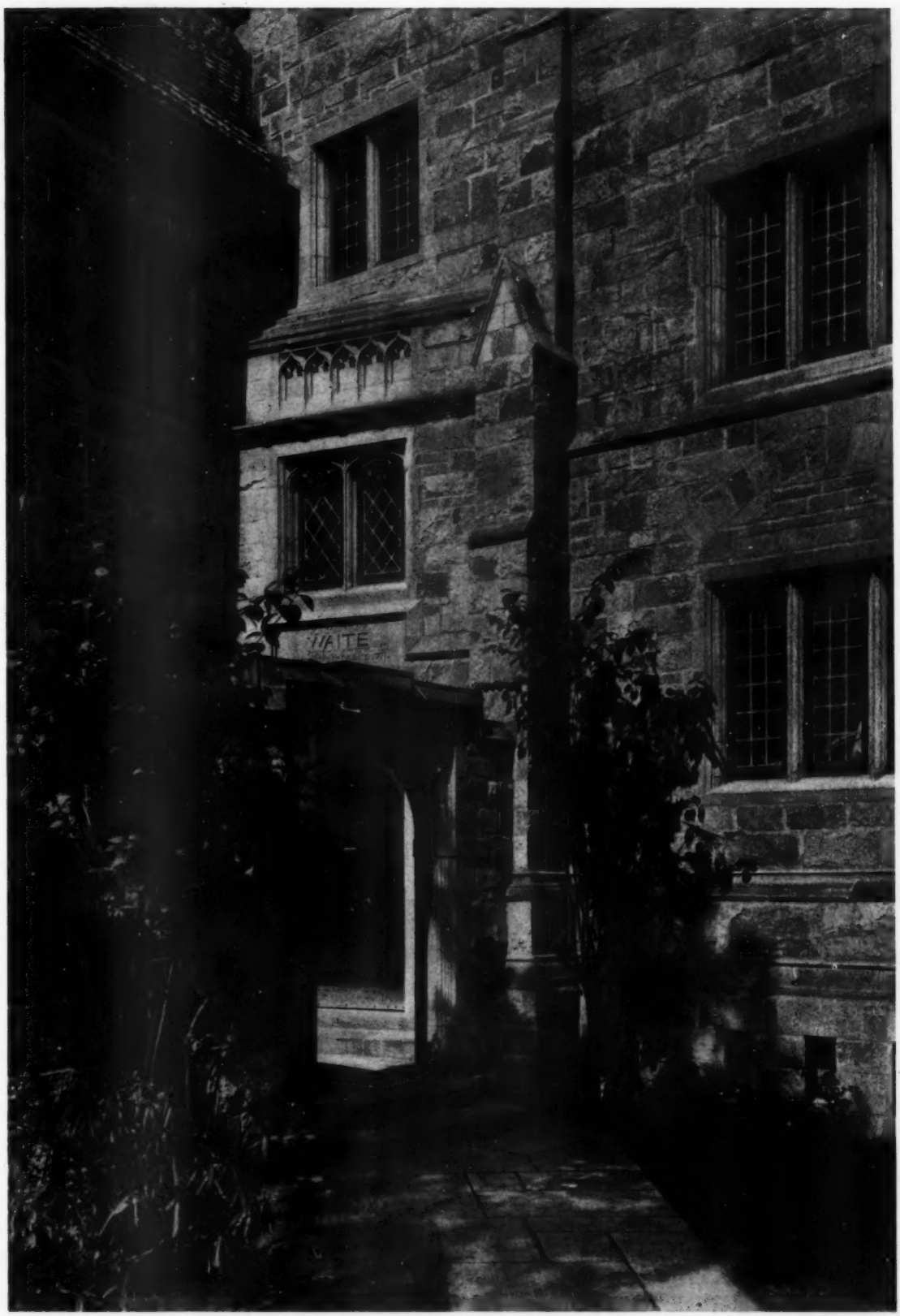
THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

CORNER IN LINONIA COURT

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT



CORNER IN SAYBROOK COURT

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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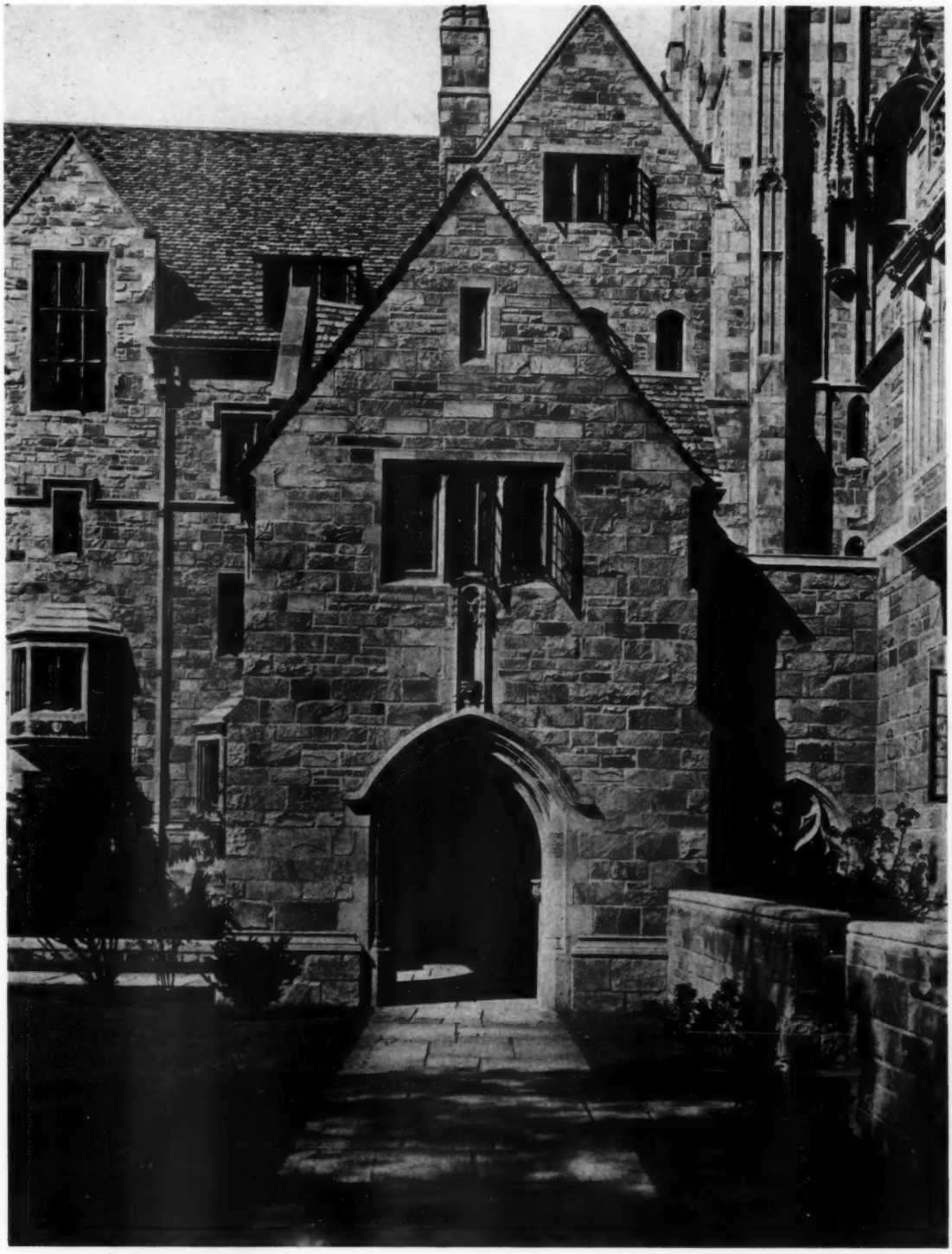

DUMMER PASSAGE

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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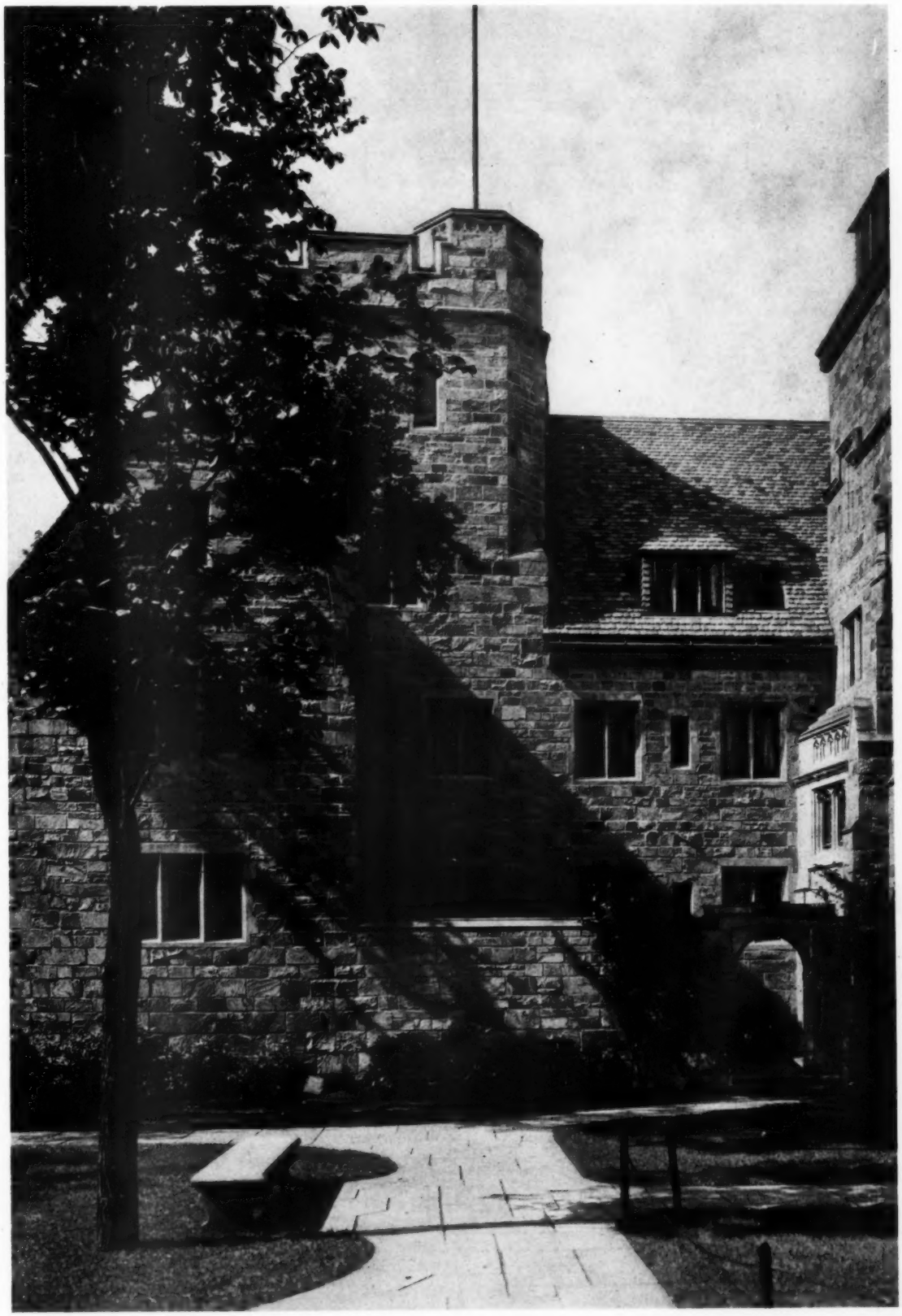

VIEW IN KILLINGWORTH COURT

THE MEMORIAL QUADRANGLE, YALE UNIVERSITY, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

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ices to Yale or of their distinctions in the field of learning. About fifty names which are famous in the annals of literature, science, mathematics, philology, theology, philosophy, economics, law, medicine, and politics are thus given a monumental celebrity. Even from the standpoint of architecture alone the abundant and carefully lettered carved inscriptions in old English Gothic, modern Gothic, Uncial, and early American lettering, above and near the gateways, are an addition to the varied effects of the architecture. From the standpoint of Yale College which has hitherto rather neglected its early days and the memory of its great men, this monumental version of the history of the University is a positive contribution to literature. It is also calculated to inspire the ambition of the students and to teach them that a College stands for something more than fame in athletics. No visitor to the Quadrangle should omit to purchase the pamphlet which furnishes complete details on this subject; written by Stanley T. Williams, 1911, at the request of the Committee on the inauguration of James Rowland Angell as the fourteenth president of Yale University and entitled, "The Memorial Quadrangle and the Harkness Memorial Tower."

In the matter of the abundant monumental symbolism and significant decorative sculpture of the Memorial Gateway and of the Harkness Memorial Tower this pamphlet should also be consulted. The writer much regrets to slight this important subject but it has been completely covered by Mr. Williams. The touches of personal and contemporary interest which are given to the Memorial Gateway by the portrait heads of Mr. Rogers and some of his assistants which decorate the bosses of the vaulting, must however, be mentioned. It may be added that the front of this gateway above the arch offers the only instance of a tooled masonry surface to be found in the Quadrangle. The idea is obviously to differentiate the masonry of the gateway from that of the tower which adjoins it on one side and from that of the High Street façade which adjoins it on the opposite side. The fact emphasizes the general preference of the architect for rough texture. It is also significant that the Memorial Gateway does not centre on Branford Court, but is placed at one of its angles. There are no central gateways in the Quadrangle. The advantage in the matter of vistas is obvious. As for the ironwork grills and gates they are not yet in position but there is no doubt that they will add one more touch of beauty, of good taste, and of competent workmanship to the total effect of the Quadrangle.

Mention must also be made of the fan-vaulted Memorial Hall which forms the interior room (about twenty-two feet square and forty feet high) of the first story of the tower. It has an oak wainscot fifteen feet high. Its memorial features have still to be determined. It will be used for official meetings. Higher up are the louvres which conceal the watertank (previously mentioned). Above these will be placed the chimes which have an unusually elaborate musical equipment.

As regards the exterior design of the tower the writer prefers to refer to the illustrations and more especially to actual vision. To describe it in words is rather futile. The tower has no rival in modern architecture and has no reason to shun comparison with the famous creations of the Middle Ages. It is so superior to anything of the kind so far erected in this country, or in modern Europe, as to create a standard by which future similar efforts must be judged. It is so close a rival of the finest medieval Gothic towers and spires as to leave one in doubt whether it may not be the equal of any. It appears not to have been mentioned so far in print, that its remarkable soaring effect is largely due (aside from the change in tone from dark to light in the rising direction) to its remarkable diminution, which is most unusual in its amount (when towers are considered as distinct from spires). This diminution produces an optical illusion as regards the height. The eye recognizes the diminution but discounts part of it into an effect of greater height*.

The beauty of the tower is also due to a strong effect of entasis, resulting from the successive and gradual contractions in size. This effect of vertical curvature is very obvious in the illustrations. The entasis is also widely used in medieval spires and towers, but is obtained in these cases by successive bends in straight lines. (This is also the case in Greek horizontal and vertical curvatures which are never true curves in the horizontals, although the contrary is generally supposed. The vertical entasis in Greek art is also generally produced by bends in straight lines).

IT is evident that residential college buildings with ground floor rooms used for studies, bedrooms, and lavatories, and with windows facing directly on the sidewalks of immediately adjacent streets, must have some sort of protection from thieves, marauders, and curious or otherwise obnoxious persons. Gratings are not to be thought of and high walls would be a serious detriment to the architecture. The expedient is obvious, after Mr. Rogers thought of it, perhaps not equally so before, to surround the Quadrangle with a moat. Of course there must be a wall to keep passers by, on the sidewalk, from falling into the moat, and also to serve as an additional barrier of protection, but this wall is of such low height as not to dam-

**On this subject see Thiersch, Optische Taüschungen auf dem Gebiete der Architektur, in the Zeitschrift für Bauwesen, 1873, p. 15; also quoted in full by Goodyear, Greek Refinements, with diagram of a Doric column showing the optical effect of increase in height, due to its diminution, pp. 155, 156.*

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age the appearance of the exterior façades. The deepest moat is on the Library Street side, perhaps because this street, being the most secluded, needs the most protection. Its wall is three and one-half feet high. The moats diminish in depth and the walls increase in height on the High Street and York Street sides and the walls reach their greatest height of six and one-half feet, near the corners formed by the meeting of Elm Street with York and High Streets. These variations in the moat wall are an additional feature of the unconventional conflict with uniform and monotonous construction, which the architect has so persistently waged. The high moat walls near and at the corners of Elm Street (on the east, west and north) must be explained by the fact that the busiest life and bustle are on the adjacent streets, especially on Elm. How then can we explain it that beyond the corners of Elm Street the shallowest moat and the lowest wall (only about two feet high) are found on this front? The answer is found in the main central portion of the Elm Street façade with its splendid and imposing sequence of eleven great Gothic traceried arches. These arches are a decorative openwork screen, behind which is concealed, and by which is protected, the true wall with its lavatory and bedroom windows (there are only three studies in this arcade). Thus we understand the double reason why the finest façade of the exterior Quadrangle is apparently unprotected from the street. The façade needs no protection and the low wall and shallow moat are needed in order to give full display to the beautiful traceried arches.

Many fine appreciations of the Memorial Quadrangle have been published. Among these is that of Professor William Lyon Phelps, who comes to the front as its warm and frank admirer. He considers the Harkness Memorial Tower as "one of the Lights of the World" and adds that the architect of a cathedral "was prophet, priest, dreamer, artist and clown. Whenever a freak thought occurred to him or a flash of humor illuminated his fancy, he perpetuated the fleeting waif. So, as one wanders around the Memorial Quadrangle, viewing it from without and within, one sees bits of humor, sardonic embellishments, queer platforms and recesses that (thank heaven) are without any useful purpose and do not make for efficiency. . . . There are so many delightful whimsicalities in these buildings that one must go to the medieval cathedrals to find a true parallel . . . . The architect ought to be doubly happy—first in having dreamed such dreams, second, in having the marvellous art to make them all come true."

The cost of this amazing contribution to the cause of learning, of education, and of architectural art, is not quoted. The architect had *carte blanche* and his achievement is priceless.

Editorial Note—At the suggestion of Mr. Goodyear the Editors will supplement this article with a republication of Mr. Williams' matter on the details and decorative sculpture of the Harkness Memorial Tower and with proper credit.

THE HARKNESS MEMORIAL TOWER

Being extracts from a pamphlet written by Stanley T. Williams, ('11), at the request of the committee on the inauguration of James Rowland Angell as President of Yale University

IN studying the Quadrangle there is a continual seduction from the logical and orderly approach to its beauty, because of the constant charm of its detail. It is, indeed, a veritable "confusion of delight." Spontaneity itself, it will not tolerate a methodical and monotonous study of its infinite variety. Like a picture it should be examined slowly, and at many times; studied not efficiently like a factory, but negligently, almost aimlessly, by walking through its cloisters, letting the special appeal of its imaginative beauty lead where it will. At one time it may be its rhythm, at another its variations of color, at still another its shadings of moulding or tracery. Here "a blossom germinates," here a face, elsewhere a grouping of tower and tree, and many times a name that stirs old memories. Forever the charm of irregularity, of "imperfection." "The foxglove blossom,—a third part bud, a third part past, a third part in full bloom,— is a style of the life of this world. And in all things that live are certain irregularities and deficiencies which are not only signs of life, but sources of beauty. No human face is exactly the same in its lines on each side, no leaf perfect in its lobes, no branch in its symmetry. All admit irregularity as they imply change; and to banish imperfection is to destroy expression, to check exertion, to paralyze vitality. All things are literally better, lovelier, and more beloved for the imperfections which have been divinely appointed."

So that to see the Tower, as with Baedecker in hand, is a formality which defeats its own end. If the visitor, then, follows the order of this paper, which is at best a literary device, and not the official and only way to see the Quadrangle, he misses much. As he crosses Branford Court to its opposite side for the best view of the Tower, he passes a thousand beauties on the way, which were well yielded to. But if time is important, and if he reserves these for a later and orderly inspection, the best sight of the Memorial Tower may be had from Johnson Entry, near the Mather Gateway, on the York Street side of the Quadrangle.

The Memorial Tower, rising two hundred and twenty feet above High Street, rests upon caissons filled with reinforced concrete, carried through the New Haven sand to bed rock. Above the Memorial Room, already described, is the Belfry, lighted by long lancet windows which appear above the first gallery. The stage above the Belfry is the Lantern. Blending with this, and melting into it imperceptibly is the Crown. For this is a "Couronne" Tower, done somewhat in the style of St. Botolph in Boston, England, a church rich in Puritan tradition through its association with the name of the Reverend John Cotton. So far as known, it is the only "Crown" tower in America, and the only one built in modern times. It has, in fact, a double crown as the result of a geometrical feat in providing a perfect octagon for the crown top. At the base of the Tower is placed dark stone which gradually grows lighter as the Tower rises, till the crown has a dazzling whiteness. The ease of the color transitions is due in large measure to Mr. George Nichols, the supervising architect, who, when the Tower was covered with scaffolding in the process of building, carried in his mind the precise shading of each succeeding portion of the Tower. Seen from Johnson Entry the combined effect of the diminuendo in color and size of the Tower is impressive. Its simple base makes it seem an inseparable part of the Quadrangle, but as it leaps upward, with the colors ever lighter and the ornament ever richer, it achieves an individual character which makes it rightly the dominant and the most brilliant feature of the whole.

Too much cannot be said of the originality and thought which inspired this feature. And before examining the ornament one should notice the development of the lines of the Tower to its climax. The lower shaft, with its louvres, is in harmony with the lower buildings, yet every line points upward to the Lantern, and the Lantern in turn, merges perfectly into the Crown. Similarly every angle of the Crown is linked with a phase of the Lantern, and the octagonal angles of the Crown are in the centers of the Lantern façades.

Note, moreover, how gradual is the rising wave of symbol and statue. On the level of the floor of the Belfry, on all four sides, are the first real traces of ornamentation: the reclining student, and other architectural humoresques. Above, at about one-half the height of the Belfry stage, are eight statues of heroic size occupying canopied niches in the main buttresses. These are figures of Yale's benefactor and her most famous sons. Beginning at the northeast corner, facing High Street they are: Jonathan Edwards; southeast corner, facing High Street, Elihu Yale; then, continuing around the Tower, Eli Whitney, Samuel F. B. Morse, John C. Calhoun, James Fenimore Cooper, Noah Webster, and Nathan Hale.

Looking further up, on the mullions of the Bel-

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fry windows are Greek figures typifying the Arts and Sciences (Phidias, Homer, Aristotle, and Euclid). Over the finials of the label mouldings of the belfry windows, and under the Lantern gallery, are bulldogs, and in the corners are grotesque birds. On the parapet of the Lantern gallery are free standing allegorical figures of Law, Business, Ministry, and Medicine, and engaged in niches in the buttress angles at the same level are figures emblematic of Life, Progress, War, Death, Peace, Prosperity, Effort, Order, Justice, Truth, Freedom and Courage. At a higher level are martial figures of the soldiers of the nation's wars, from the Revolution to the last war. The projecting gargoyles are representations of students suggestive of various undergraduate activities: Scholarship, Athletics, Literary, and Social Interests (notice the pen and the teacup!). Besides these there are various other minor sculptures, such as the bulldogs at the base of the statue of Elihu Yale; and beneath the statue of Nathan Hale the carving of the Indian head. The Arts and Sciences are supported by the figures of Adam and Eve. Excellent places from which to study the detail of the sculptured figures are: the campus between Dwight Hall and the Old Library; Linonia Court, Branford Court, or from the roof near the small High Street tower.

THE GREEKS AND ARITHMETIC
A COMMUNICATION

To the Editor,
The American Architect and
The Architectural Review.

MAY I be permitted, as a reader of your paper, to dissent from some statements made by Mr. Kane in his article on the Hambidge Theory, appearing in your October 12th issue?

The Hambidge Law of Dynamic Symmetry is beautiful and his classic work on the Greek Vase has influenced designers as nothing else influenced them since the days when the Greeks were masters of the plastic arts. Mr. Hambidge seems to have discovered Nature's law for the formation of the repetition of parts in a completed whole. It happens that the law is geometrical. The reason for the employment of this law of symmetrical development was not due to any ignorance of arithmetic on the part of the ancient Greeks. The result looked for could best be obtained by geometrical reasoning. That is all. Arithmetic could be, no doubt was, used in practical applications in order to simplify operations. The basis, however, is geometrical and too minute descriptions of ancient surveying methods detract from a presentation of the theory of Mr. Hambidge.

The Parthenon was begun about 450 B. C. by Ictinus, under the political direction of Pericles and the artistic presidency of Phidias. This incomparable triumph of architecture was preceded by 150 years of progress in arithmetic and geometry by the Greeks. Although it is known that quadratic equations were first solved 1,000 years earlier, algebra did not appear until later and trigonometry did not become a separate branch for many centuries later. The Greek mathematicians knew only arithmetic and geometry.

Pythagoras was a Phoenician, supposed to have lived from 580 to 500 B. C. The greater part of his life was spent in Greece and he is honored as a Greek philosopher. Of him Cajori in his "History of Mathematics" said, "Pythagoras raised mathematics to the rank of a science. Arithmetic was courted by him as fervently as geometry. In fact, arithmetic is the foundation of his philosophic system." Note that Pythagoras is believed to have died 50 years before Ictinus began his labor on the Parthenon.

Thales (640-546 B. C.) was a Phoenician according to Herodotus, but some Greek writers claim he was an Ionic Greek of Phoenician ancestry. He spent some years studying in Egypt from which country he took to Greece about 600 B. C. all the Egyptians had taught him of geometry. He measured the heights of the pyramids by the lengths of their shadows and measured the distances of ships at sea by the use of triangles. All of this means ability to use proportion, a knowledge of multiplication and division and the use of surveying instruments, perhaps the goniometer, an angle measuring instrument used for many centuries by the Egyptians. Greek numerical symbols occur as early as the time of Solon, 638-559 B. C. Note that Thales died 96 years and Solon died 109 years before the foundations were laid for the Parthenon.

Geometry was developed by the Egyptians as a land surveying science because the annual rise of the Nile destroyed landmarks. Arithmetic was developed by the Semitic peoples on the Sumerian plain and in the valley of the Tigris for commercial purposes. The Phoenicians as merchants and navigators brought together all the known mathematical knowledge of the times so that prior to 600 B. C. the Egyptians, Phoenicians and Chal-

deans computed eclipses, made tables of the movements of the planets, etc. As early as 3000 B. C. there were well developed systems of weights, measures and coinage, the workmen of Tyre and Sidon supplying neighboring peoples with weights, measures and astronomical instruments.

Babylonian tablets known to have been made some time between 1700 and 2300 B. C. prove that the decimal system was in that epoch in common use. There was also employed a sexagesimal system, surviving today in our circle divided into 360 degrees, with each degree divided into 60 minutes and each minute divided into 60 seconds. One tablet contains a table of numbers up to 60 with their squares and remarks which prove the Babylonians were well acquainted with progressions. In Egypt was found the Ahmes papyrus written 1700 B. C. and known to be a revised and rewritten work, the first edition of which appeared in 3400 B. C. Its style indicates that it was written for the elite among Egyptian mathematicians and references are made to other treatises. From this work we learn that common fractions were in use in Egypt as early as 2500 B. C.

Common arithmetic was early known to Greek merchants, but the philosophers and learned men ignored it as something for common people. When Thales brought geometry to their attention, they pursued this science with enthusiasm, the coming of Pythagoras making arithmetic a science alongside of geometry. By 450 B. C. when the Parthenon was commenced, arithmetic, that is addition, subtraction, multiplication and division, proportion, involution and evolution and mensuration was as well developed as it is today. According to Aristoxemus it was the glory of the Pythagoreans that they raised arithmetic above the needs of merchants. It was their boast that they sought knowledge and not wealth, or, in the language of one of their maxims, "a figure and a step forwards, not a figure to gain three oboli." Readers who may doubt the foregoing statements are referred to "A Short History of Mathematics" by W. R. Ball. "A History of Elementary Mathematics" and "A History of Mathematics" by Florian Cajori.

I am a believer in the Hambidge Theory, but cannot accept the idea presented by Mr. Kane that it was used by the Greeks because of their ignorance of, or inability to use arithmetic. We must assume that in their geometrical studies the Greeks stumbled upon and developed the law of dynamic symmetry and a few inspired master builders had sense enough to apply it in designing their masterpieces.

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DEPARTMENT OF SPECIFICATIONS

THE subject discussed in this department in the last issue was the matter of surveys and of questions that should be answered before the actual preparation of working drawings is commenced. During the time the survey information is being obtained it is presumed the drafting room has been engaged in the preliminary studying of designs, both exterior and interior, and the determination of interior room arrangement. Immediately the question as to materials arises and the co-operation and assistance of the specification writer are essential to a unified development of the entire scheme.

This does not mean that the specification writer is to determine or even suggest what finish materials such as marble, plaster, wood, etc., should be used but since he must know what is desired he should be brought into discussions at this point. Perhaps the best, and most simple, means of obtaining some preliminary settlement of the materials that are to be used for exterior and interior treatment may be accomplished by means of a tabulation or schedule of all rooms and spaces. It is not necessary that choices of kinds of marbles, plaster finishes or woods be made at this time but in the majority of operations it is possible to say whether the floor will be wood, tile, marble, cement for carpet or for cork tile or linoleum. In the case of base it may be marble, slate, structural glass, wood, terrazzo, metal, tile, cork or other materials. All other finish materials should be given similar consideration and when it is impossible to arrive at a tentative determination question marks should be used as concrete indications that no decision has been made.

This tabulation or schedule should be laid out on a large sheet of paper with horizontal lines spaced about one inch apart and columns made about two inches wide. Then, in the first column at the left hand side of the sheet make a list of all rooms and spaces throughout the entire building. Each vertical column should be given a heading, such as floor, base, dado or wainscot, chair rail, picture mould, wire mould, cornice, general wall surfaces, window stools, window trim, door trim, ceilings, ventilation grilles, radiator grilles and such special headings as may be applicable to the case in hand, among these being fire-place hearth and surround, electrical lighting outlets, electric call or signal system outlets, etc. Rooms that are to be designed in period styles could very well have a column for hardware so that when making up the hardware schedule such factors will be expressed clearly and unmistakably.

On the schedule sheet there should appear notations as to exterior finish materials such as stone, brick, marble, tile, stucco, door frames, window frames, grilles for door or window openings, cornice and all other features of major importance that probably have been fixed to a certain extent at this stage of the work.

If the general layout of the floor plans is fairly complete a type schedule of door and window openings next should be prepared, this schedule to describe graphically the material of which the door and jambs are to be made whether there are glass panels, ventilation registers, transoms having glass or wood panels and other data that it may be necessary to have at hand. If certain factors are still undetermined spaces can be left for later notations. Eventually it is expected that all openings will be given certain numbers or else numbered consecutively according to some easily understood system but in the preliminary stages of the work it will probably be possible to fix on the various types of openings. Consecutive numbering, cannot, of course, be made until the drawings are so far completed that there will be no further re-arrangements.

On the door and window schedule there should be noted the kinds of hardware that are to be used, such as butts, floor hinges, checks, transom operators, kick plates, and bottom bolts, door holders, spring catch and chains for transoms, letter drops for office doors and the window sash lifts, locks, pole sockets, butts and locking devices for hinged sash and all other hardware trim.

THE next step will be the arrangement of the outline. No matter from what source the general clauses are drawn, whether from a card index file or a loose-leaf master specification book the outline for a specific building always should be prepared separately and with as great care as has been spent on the index or master specification. Although previous articles have discussed this subject with a certain degree of thoroughness it is thought best to record once more the work that must be done and how it should be done in order that the best results may be accomplished.

The outline should be started by setting down at the top of separate sheets each of the trade divisions, such as demolition of existing buildings, excavation, etc., devoting one sheet to each operation that is to be made the subject of one section of the specifications. Each possible subdivision of the section outlines should be listed in proper consecutive order, thus making as complete a skele-

ton form as possible. Then, as the work progresses, the outlines can be extended in as complete detail as seems necessary. The first outline may be quite rough, especially for buildings that are to be trimmed and finished in an elaborate manner and as the work on the drawings proceeds the elaboration necessary will suggest itself. Too much stress cannot be laid on the rule that outlines should be made as complete and comprehensive as the nature of the work permits as a clear understanding of the problems and factors involved can only be had through such media.

In offices that restrict their practice to one or a few classes of building it is very probable that the master specification and master outline will have been so subdivided and grouped as to give all outline information necessary to proceed with the writing of the specifications by making copies of the outline with sufficient space between each item to permit the insertion of items peculiar to the particular structure. The judgment of the specification writer must be depended upon to guide him in this respect.

As the work on the drawings proceeds the specification writer will find it of great advantage to look over the drawings every day with a view to giving advice or suggestions as to how certain objects are to be accomplished, as to what should be indicated for more extended exposition in the specifications or as to what should be shown on the drawings in as great detail as possible so as to permit of brief description in the specifications.

It should be borne in mind that the specifications should be qualitative and not quantitative. That is to say, the specifications should be restricted to the quality of material and workmanship, what is to be furnished or omitted and similar factors and should not describe in detail how much of one thing or another is to be furnished or done. This latter service is distinctly a function of the drawings, more particularly in those cases where the complexity of the structural and architectural finishes preclude the possibility of the specifications treating quantities in as accurate or understandable a manner as can the drawings. It is in this connection that the assistance of the specification writer is of value in the drafting room. While making notes from drawings for future use one should make sure that reference notes are made for all sections or trades that may be affected by any one particular item so that work that is to be furnished by other contractors to accomplish the satisfactory and correct installation of that item may be specified or else, if more convenient, shown on the drawings.

The effective and whole-hearted co-operation between the drafting room and the specification writer is one of the main desiderata in the proper co-ordination of the work. In those offices where the specifications are written by the man who is in charge of the drafting room (and this is the condition in the majority of offices) there will, of course, be no question as to the amount of co-operation it is possible to effect. And in those offices that are departmentalized it is probably true that there is this co-operation because of the esprit-de-corps that invariably rules. Yet it is quite essential that attention be drawn to its necessity for the good of the specifications.

SOME suggestions in respect to the checking of the drawings seem to be in order at this stage of the work. Proper checking is most difficult of accomplishment unless the checker is thoroughly conversant with the desires of the client, the intention of the architect and his organization to meet these desires in proper fashion, the materials that are to be used or that are available in those cases where esthetics have no control and, perhaps the most important of all, the processes of shop and field practice as it affects the work that is to be done. There are usually more wrong ways to accomplish a desired end than there are right ways and of the correct methods that are available there can be no case imagined wherein there will not be found one scheme that stands supreme over all others.

It is for these reasons that too great emphasis can not be laid on the all important fact that the specification writer should be familiar—thoroughly conversant—with the various processes of manufacture, fabrication and finishing of raw materials and the most economical and efficient means for the accomplishment of their installation. It is, of course, understood that those responsible for the production of the drawings will attempt to do everything in the correct and economical manner that, especially now, is so necessary, yet, as the specification writer is usually the last one to check the drawings, he too, should possess all of these qualities.

Furthermore, in the checking of drawings, they must be approached from the viewpoint of three dimensions. That is to say, when looking at the drawings, one must place himself in such a position, mentally, that he can look around him and see how one thing will intersect with another, how super-position must be obtained from the consideration of structural integrity and how the linear representation truly or entirely represents one of the features of the work. In order that this may be done effectively the checker not only should be thoroughly familiar with all of the drawings but he should know what future drawings, such as large scale and full size details will or should show and also whether methods of construction detailed or merely indicated are the proper ones to use. The mental visualization of all of these factors is an absolute necessity, otherwise the confusion and errors of omission or commission will be too

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glaringly apparent in the field for the peace of mind of their perpetrators. In those cases where, for one reason or another, it is not considered essential to show how particular results are to be obtained it must be ascertained whether the indication presented is sufficiently clear so as not to cause rebellion on the part of the contractor when he receives the later large scale or full size detail or else the specification writer must make his specifications so clear in all details that the contractor, when reading them, can have a mental picture of the detail drawings that he knows will be submitted to him at a later date.

The checking of the drawings will be facilitated to a very great extent if the various schedules mentioned heretofore have been prepared and kept up to date during the progress of the work on the drawings. Then too, the specification outlines, that is, the master outline and the outline in preparation for the specific structure, will act as checking lists and again will justify the great care that should be put into their preparation. As the outline develops the checking of the drawings can be made more intensive and this giving of the attention first to one and then to the other will tend toward obtaining a more accurate set of drawings and specifications.

One important matter that must be kept in mind when checking the drawings is the use that will be made of standard methods that have been adopted or that seem desirable for adoption. New draftsmen, unless they have been made familiar with the details of office practice by means of printed instructions or notes, are prone to do their work in the way to which they have accustomed themselves, regardless of any possibility of standards. Despite the vigilance of the one who is in immediate charge of the preparation of drawings errors do creep in through the fault of no particular person and the specification writer must look for such things while he is doing his checking. He can then see to it that the draftsman is made acquainted with the way in which the office wants such work shown and, after a number of such incidents he will probably make sure that a more comprehensive method of instruction is prepared for the strangers.

IN the matter of the use of standard articles or methods it should not be assumed that because they have been denominated such they are not subject to change or modification. Unless the work of an office comprises one or two classes of buildings that do subject themselves to such standardization great care should be exercised in the constant use of standard articles to make certain that the conditions that made standardization possible are present in that particular instance. Standards are quite desirable to have about oneself if they are used judicially and if one knows when they should be modified or when they should be rejected *in toto* and new methods developed.

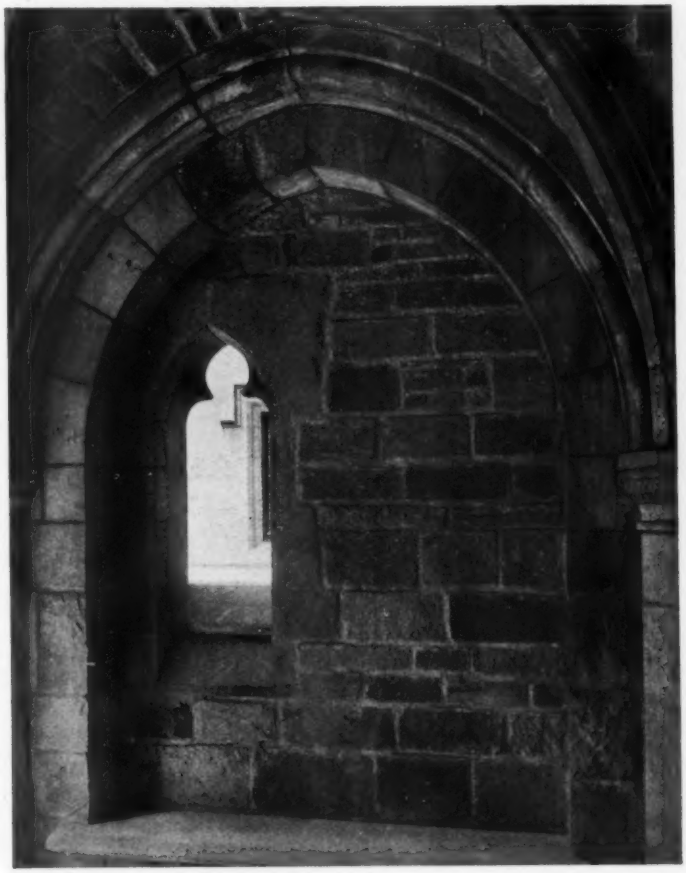
Then too, in the case of buildings that are to be erected in localities new to the architect, unless he has made certain that average building conditions there are the same as they are in the locality in which he is accustomed to do work, the use of standards involving a great deal of work should be approached with caution. Here the ingenuity of the specification writer must be brought into play while checking the drawings as he should be certain that the requirements of the drawings can be accomplished with ease and facility by the contractor who will be expected to do the work.

When the drawings have been carried along fairly well and most of the information necessary for the intelligent writing of specifications is available the work of assembling the detail clauses for each section should be commenced. Too often the seemingly urgent necessity for finishing the work offers the temptation to commence the writing of the specifications before they should be started. In most cases there is a great deal of information that will not be available until almost the last minute and then, as has been suggested heretofore, there should be a period of several days after the drawings are finished before the last touch is given the specifications. This is necessary to permit the specification writer to do his final checking and make sure that the co-ordination of the drawings and specifications have been accomplished in the proper manner. It is nonsensical to spend a great deal of care in the preparation of specifications in their preliminary stages and, at the end, rush them to a hap-hazard state of completion, at the same time very possibly doing them a great deal of harm. The additional few days that should be devoted to the final polishing-up processes will have been forgotten when the building has been completed and it is quite possible that thanks will be given that the extra time was taken in order to insure a happy termination of the construction work.

However, this should not excuse the specification writer in knowingly delaying his work either because of procrastination or a general desire to take a great deal of time in the execution of his share of the work. The specifications should be started whenever there is sufficient data available to warrant the spending of even a few hours' time each day on them as, from the inception of the work there are certain matters that must of necessity be fixed at once. But there should be no pre-judgment or anticipation of what the requirements of the drawings will be unless it can be established that conditions can be foreseen in sufficient detail to justify the preparation of a few clauses here and there on the understanding that the drawings will be made in conformity thereto. Sometimes assumptions will be made with the best of intentions

but because of misplaced notes or neglect to inform the drafting room of such assumptions conditions entirely different will be developed. These may be caught in the checking of the drawings, as they should be, but the fewer the errors that must be discovered during the work of checking the fewer will be the opportunities of letting such errors pass for later discovery in the field.

If the specification writer can check the drawings with the ultimate object of seeing that everything has been included that should be included and that all things are correct rather than be forced to look for errors here and there and everywhere his work will be made a great deal easier. This is dependent on the precision obtaining in the drafting room and can only be obtained where there is complete co-operation and intimate mutual understanding of the work. Under such conditions the specifications should be in co-ordination with the drawings and real success then will be assured.



Masonry Detail—Memorial Quadrangle, Yale University, New Haven, Conn.

James Gamble Rogers, Architect

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DEPARTMENT OF ARCHITECTURAL ENGINEERING

Residence of Mr. E. B. Meyerowitz, So. Orange, N. J. The permanent character of slate roofing permits it to be laid on varying pitches without changing the head-lap

SLATE AS A PERMANENT ROOFING MATERIAL*

Introduction

DURING recent months the Bureau of Mines has conducted a detailed study of the slate industry, the results of which will be incorporated in a forthcoming bulletin. The purpose of this preliminary paper is to bring to the attention of slate producers certain modifications in manufacture and classification which would encourage a wider use of slate; to direct the thought of roofers toward the importance of proper laying of slate, and to acquaint the general public with its enduring qualities.

**Abridgement of a paper by Oliver Bowles, Mineral Technologist, Bureau of Mines.*

Origin and Character

It may be of interest to the general reader to know that slate is originally formed from mud or soft clay, carried down by streams and laid down in successive layers in deep water. The pressure of superimposed materials gradually compresses the clay into a firm rock known as shale. In many places this shale was, during the succeeding ages, subjected to intense pressure and folding due to mountain-building forces within the earth. This intense pressure, together with high temperature, changed the clay into other minerals such as mica, chlorite, and silica, which are resistant to weathering, and also developed a definite cleavage or split-

ting direction which characterizes the rock as slate. It is this property which renders slate of value for roofing, for, by using a broad chisel and a wooden mallet, a slate worker can readily split it into thin sheets which are later trimmed into rectangles of various sizes.

Slate roof with curved surfaces. Kew Gardens, L. I. Walter McQuade, Architect. The selection of vari-colored slates, for this roof is particularly appropriate for half-timbered construction

Possible Improvements in Manufacture and Classification

Slates should be graded and classified in such a way that the consumer will not be deceived by their characteristics. Instances have occurred where a purchaser requesting and expecting an unfading slate has been supplied with fading slates simply because the producer could not supply the desired quality and did not wish to lose the sale. Such operators commonly meet with failure after a brief and inglorious period of deception, but during the short span of their activities much harm has been done to the reputation of slate.

Residence of Mr. Wilkinson, Glenwolde, L. I. Walter McQuade, Architect. A well selected slate roof tones with surrounding foliage at all times of the year

It is believed that a truer classification of the established grades would render slate more popular. For example, the professional roofer knows the changing effects of "sea green" slate, but the purchaser commonly does not know that the original color alters to various shades. Such variability in color is by no means undesirable, for it gives many beautiful effects, and such slates are much in demand. If the inexperienced purchaser, however, buys "sea green" slate with the object of obtaining a green roof, he will find that he has made a mistake. It would be better, therefore, to employ a more descriptive term for "sea green" such as "weathering green variegated." As the term "sea green" is long-established, it might be bracketed after the new term until the latter had become well known.

The term "variegated" when used alone also leads to confusion. The experienced dealer knows that "variegated" is a mottled green and purple, but there is nothing in the term to convey this impression to the public. Would it not be better to have trade names that briefly and definitely describe the slates, and that give the purchaser reliable information as to whether the colors are fast or changing?

Residence of Mr. V. A. Wiss, Morris Plains, N. J. Stone walls, stucco walls and a slate roof make a fire resistant house

Slates from some localities are much weaker than from others. Weakness in the material results in excessive waste from breakage in punching, and in the frequent appearance of broken slates in the finished roof. As a protection to the public, and to maintain a high reputation for slate, it would seem advisable to conduct frequent tests of transverse strength, and to reject all slates that fall below a certain standard. Many products such as cement are sampled and tested frequently, and continued purchases are made only if the product conforms with certain fixed specifications. The slate dealer would do much to popularize his product if the same rigid tests were applied, and all

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slates that failed were summarily rejected. Some slate selling organizations now classify slates according to strength, and adjust prices in conformity with their relative qualities.

The dealer should endeavor to cater to the demands of the consuming trade in so far as such demands do not impair the quality of the product. One of these demands is for a thickness sufficient to prevent excessive breakage. In certain regions slate splits with great freedom, giving thin uniform slabs. As slate is sold on the basis of surface area, it is obvious that a slate maker can obtain greater returns from a block split into thin slabs, than he can obtain from the same block split into thick ones. Also the weight per square is less, which involves lower charges for haulage. Consequently there is a tendency to make thin slates from free-splitting rock. If slates fall below 3/16 inch in thickness they are likely to be so weakened that undue losses occur from breakage during punching and laying. While such breakage may involve the loss of considerable slate, there are even more serious aspects to the use of weak slates. The staging which supports the workmen while they place the upper courses of a roof must rest on the lower courses already finished and its supports may break weak slates in these lower courses. Furthermore painters, window cleaners and other workers may at various times find occasion to stand on the roof, with resulting breakage of weak slates. Such breakages involve replacement of broken slates on the finished roof, which is somewhat difficult, and slates so placed are never as satisfactory as the original ones. The annoyance and expense involved in the use of weak slates have had a detri-

Residence with slate roof, So. Orange, N. J. The wide spacing of the slates on this roof accents the artistic lines of the building

mental influence on the use of slate. It is believed that if slate producers would maintain a thickness a little greater than 3/16 inch rather than less, the advantage gained from this better service to the consumer would be ample to offset the slight saving in material or in the freight charges involved in making the thinner ones. Rejections of orders have resulted from deficiency in thickness of slates, and it is much better to keep right up to standard or even to excel it. A satisfied customer brings

A fine example of slate roof with broken and curved surfaces. Kew Gardens, L. I. Walter McQuade, Architect

repeated orders, and a satisfactory roof is the very best advertisement.

Another way in which the manufacturer can render his products more salable is to specialize in popular sizes. A slate maker can manufacture more squares of the larger sizes in a month than he can of the smaller ones, and there is a tendency to regard volume of production as an item of more importance than the manufacture of sizes that the trade demands. If the customer is by any means persuaded to take the larger sizes, he will probably be dissatisfied, and may not only cease to purchase from this particular producer, but may even turn to other types of roofing manufactured in standard popular sizes.

The Roofer's Responsibility

To secure a roof of high quality, part of the responsibility rests on the roofing contractor. The contractor's duty is to lay the slate on the roof in accordance with the most approved practice. It is commonly stated that any carpenter can lay slate, and many roofs are laid by inexperienced workmen. Slate roofs give much better service when placed by men who specialize in such work. For example, most carpenters in placing slates drive the nails "home," just as they would in securing wooden shingles, with the result that when the sheeting dries and shrinks the slates are cracked. A skilled slate roofer does not drive the nail to its full depth, but allows the slate to hang loosely.

Another common error is due to mistaken econ-

omy or, in some instances, even dishonesty on the part of the roofer, for in order to save slates he may give a head-lap less than the regulation requirement of three inches. As a result the roof may leak, not through any fault of the material, but through improper workmanship. The law in some States renders it illegal to place slates with less than a three-inch head-lap.

Parochial Residence, Hackensack, N. J.

Occasionally the nail holes in slates are punched by the manufacturer before shipment. However, the practical roofer usually punches the slates at the place where they are to be used, and during the punching process he selects them into three grades, thin, medium, and thick. The heaviest slates are then placed near the eaves, those of medium thickness midway, and the lightest at the

Residence with slate roof, Glenwolde, L. I.
Walter McQuade, Architect

ridge, which gives a very uniform roof.

Upon the roofing contractor, to a great extent, the reputation of slate depends, and his efficient and honest service is reflected in the satisfaction of all those who may be sheltered by the roof of his construction.

The Enduring Qualities of Slate

No practical roofing material has yet been found that can excel natural slate for permanence or satisfactory service. In judging the permanence of a roof, the age of the building it covers is commonly regarded as being the age of the roof, but this may not be a true criterion. It is reported that in the Peach Bottom slate district of Pennsylvania and Maryland the same slates were used on seven successive buildings during a period of over 100 years, and in England, slates have commonly been moved from one structure to another. American history covers so brief a period that it can properly record only the initial stages of the life of a slate roof, and on this account multitudes of people have little conception of the actual period of useful service a slate roof is capable of rendering. Consequently one must go to the old world to obtain records of real value. In England and Wales, and in France many buildings constructed in the 15th and 16th centuries were roofed with slate, and the

A roof which illustrates the possibilities of slate as a material for broken surfaces. Glenwolde, L. I.
Walter McQuade, Architect

roofs are still in excellent condition. There is a record of a chapel in Bedford-on-Avon in Wiltshire, England, roofed with slate in the 8th century, and after 1,200 years of climatic exposure the roof is moss-covered but in good condition.

Every household knows that a leaky roof not only is a source of continual annoyance, but that it seriously impairs the walls and ceiling, and probably the contents of the structure that it is designed to protect. In the first place, therefore, it is well to point out that properly manufactured slates laid according to established practice on uniform and strong supports of moderately steep pitch will provide a roof that will not leak. Furthermore, as pointed out in earlier paragraphs, a roof so constructed will maintain its quality for very many years without any repairs or treatment other than the occasional replacement of a broken

slate. A more general recognition of the inherent qualities of slate would no doubt lead to its wider use, for, while the first cost is greater than that of many types of roofing, the low maintenance and replacement costs render it an inexpensive roofing material when long service is considered.

Residence of Major Hawkins, Montclair, N. J. M. J. Stillman, Architect. Slate is the proper material for the roof of this house

CONCRETING IN COLD WEATHER

Suggestions for precautions to be observed in placing concrete in the Fall and Winter months.

A reader of *The American Architect* suggests that this is the time of year to sound a warning on the subject of mixing concrete during the Fall months. He says that the days of continuously lowering temperature are more dangerous than days when the temperature is below freezing and even the least intelligent men deem it essential to protect fresh work. He states that in his experience there are more concrete building failures in October and November than in other months because the mild weather is deceptive and forms are removed too soon. Low temperatures retard setting and sometimes stop it completely. Though the concrete may not be frozen it falls far short of having the required strength and a failure results if load is applied before the surrounding air is warm enough to permit the setting to be completed.

The following extracts from specifications for a reinforced concrete structure were enclosed in the letter:

"Concreting During a Period of Lowering Temperature."

"The inspector will paste in his daily report a clipping of the daily local weather record and forecast. The contractor will keep on the job three thermometers approved by the engineer, one to be close to the mixer, one on the floor where concrete is being poured and one outside his office, the conditions of exposure being as nearly as possible identical. After work is enclosed a fourth thermometer must be provided within the enclosure.

"When the temperature is close to 50 deg. Fah. at 5 P. M., the contractor must provide an enclosure around the work being poured, place a thermometer within the enclosure and provide heat to maintain the temperature within the enclosure at not less than 50 deg. Fah. for not less than four hours after pouring is stopped for the day.

"When the three thermometers, or any one of them, outside the enclosure register a temperature as low as 50 deg. Fah. before noon and the indications point to lower temperatures than 50 deg. Fah. within four hours after pouring is stopped for the day, the contractor must use warm water in mixing concrete. Similarly when the temperature falls as low as 40 deg. Fah. at any time during the day, the contractor must warm all water, sand and coarse aggregate. The temperature

within the enclosure where concrete is being poured must not be permitted to fall below 50 deg. Fah. while concrete is being poured nor fall below 40 deg. Fah. within four hours after pouring is stopped for the day. The temperature within the enclosure must not be permitted to fall below 36 deg. Fah. at any time within 48 hours after concrete has been poured, a sufficient number of thermometers being used to permit easy observation of temperatures at several places within the enclosure at all times.

"When the outside temperature is below 32 deg. Fah. all material piles must be free from ice and lumps of frozen material. No lumps of frozen material shall be put into the concrete, even when the materials are being warmed, but they must be thrown out or be thawed in some other container than that in which materials are warmed before going into the mixer. No concrete shall be deposited in forms containing, or coated with ice."

"Testing Frozen Concrete."

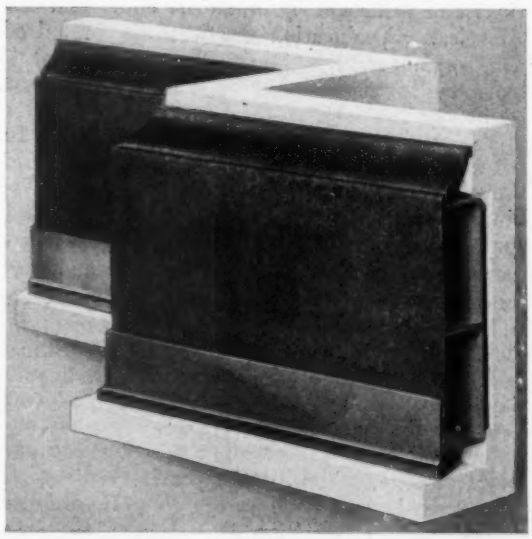
"If there is reason for suspicion that concrete is frozen no reliance shall be placed on the hammer test alone, nor shall reliance be placed upon hardness determined merely by trying to drive nails into the concrete. To test concrete in beams, girders, walls or posts two thick girdles of burlap shall be placed about six inches apart with a covering of burlap between these girdles. The burlap shall be kept wet with boiling water for a period of at least one hour, after which tests with hammers and nails may be made to ascertain the degree of softening, if any. To test concrete in a floor construct a dam four to six inches high of clay and rope or cloth, around an area four to five feet square and fill the enclosure with boiling water, changing it when it becomes cold until the floor has been under water for not less than one hour. If no softening is apparent the concrete may be assumed to be set and not frozen. No tests for frozen concrete shall be made when the outside air temperature is below 36 deg. Fah. No forms shall be removed when suspicion exists that concrete may be frozen until after the foregoing tests have been made, after which the forms shall remain in place for not less than ten days with the outside temperature higher than 36 deg. Fah."

Lumber From Bagasse

BAGASSE is dried sugar cane from which has been extracted all contained sugar. In the State of Louisiana over 400,000 tons of this material must be disposed of annually as waste and the cost of this disposal increases the cost of sugar making. A method has been perfected for the making of wood from bagasse and a half-million dollar plant has been built in New Orleans to make this new by-product. It is a fibrous material made into boards ¾-in. and 1-in. in thickness. All pieces are four feet wide and in standard lengths of eight and twelve feet. The process of manufacture is such that pieces can be furnished up to twelve feet in width and of any length. The claim is made by the manufacturers that waterproofing material incorporated in the pulp during manufacture makes the lumber waterproof so it is equally serviceable for inside and outside work. The weight is approximately 8-lb. per cubic foot, which makes it practically an artificial cork but much stronger. On account of the cellular composition it is said to be ideal for insulating purposes, in addition to being valuable as a wall board and for the making of packing boxes.

A Wall Base Conduit

A new metal wall base is on the market which is a combination base, electric conduit for high and low tension wires and a continuous electric outlet box. The accompanying figure shows in detail the natural bronze mop-mold at bottom, the plaster mold at the top and the removable base front. The upper space is for high tension



wires and the lower space is for low tension wires. The base front is made in sections so that all the wiring in a room may be exposed to view and outlets may be placed at any point with ease. The use of this base will obviate much wiring for prefixed base outlets and eliminate changes of wiring for each tenant.

XUM

THE AMERICAN SPECIFICATION INSTITUTE

127 North Dearborn Street, Chicago.
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As heretofore produced specifications have been largely the product of individual effort and as such have varied in many features that can be conventionalized so as to be common to all. Owing to a present lack of means for collecting and distributing information concerning specifications and the writing thereof, there is a needless duplication of study, research and labor on the part of specification writers. Practically all other professions are so organized that the interchange of knowledge is affected with resulting improvement in the quality of production and professional standing. It is to improve the conditions affecting the writing of specifications and to benefit by organized effort that The American Specification Institute is organized. This organization is intended to be national in scope and invites co-operation of all those interested in specifications.

The purpose of The American Specification Institute is to increase knowledge concerning and improve the methods of writing specifications. The kinds of specifications included are those for buildings, engineering structures and all works whatsoever in which materials of construction and labor are used; for the installation and use of mechanical and sanitary apparatus and equipment; for the fabrication and installation of all furnishings and furniture; for all ornaments and ornamentation, both interior and exterior; for paving, planting, embellishing and improving of grounds and waterways; and for such other things as are produced or sold on specifications.

A recent issue of Engineering News-Record contained the following editorial:

How the Product Is Made

"In a recent bulletin the National Paving Brick Manufacturers' Association expresses the wish that every engineer and public official might find time to visit a paving brick plant in its operating hours. It contends that the time will be well spent by the visitor and is frank to say that the paving brick manufacturer would profit from the time that he would contribute as guide and host. It would be a reflection upon the intelligence of engineers and contractors to argue the case in favor of careful inspection, and even study, of the manufacturing processes by which construction materials are produced. Nevertheless, the experience of manufacturers is that relatively few of their customers interest themselves in the operations by which the materials are made available. Buyers know what these processes are in a general way, but lacking acquaintance with details, are unacquainted with the factors that go to make a good or a bad product. We do not mean that one must be thoroughly familiar with manufacturing processes to be able to specify a proper material, but we do believe the joint interest of user and producer would be served by more familiarity on the part of the user with the manufacturing processes. The corollary, of course, also holds—yet the producer should know the conditions of use. Many efforts toward securing this mutual understanding have been made, the greatest being the continual efforts of The American Society for Testing Materials. These efforts would be much furthered if the thought expressed by the National Paving Brick Manufacturers' Association were more often acted upon —that engineers and contractors and public officials would visit brick plants and the establishments of other producers of materials as well."

THERE is presented in this editorial the almost universal conviction that one who attempts to write specifications for architectural or engineering work needs to be acquainted with the various processes through which a finished article has passed in order that it may be made available for use. Although this editorial has been written with special reference to the civil and structural engineering professions the sentiments expressed are equally as applicable to the architectural profession.

Intimately related to the desirability of knowing how any product is made is the knowledge of its economic worth in respect to the work of which

Residence of Francis A. Nelson, Architect, Upper Montclair, N. J. On the exterior, hand-hewn cypress shingles are used, stained with Old Virginia White. Roof stained with Cabot's Creosote Stains.

Cabot's Old Virginia White

The Clean, Brilliant "Whitewash-white"

Old Virginia White has real distinction. It is softer but brighter white than paint, and its texture is essentially different. It is as handsome as new whitewash and as lasting as paint—though cheaper. It has the genuine old Colonial effect and when combined with

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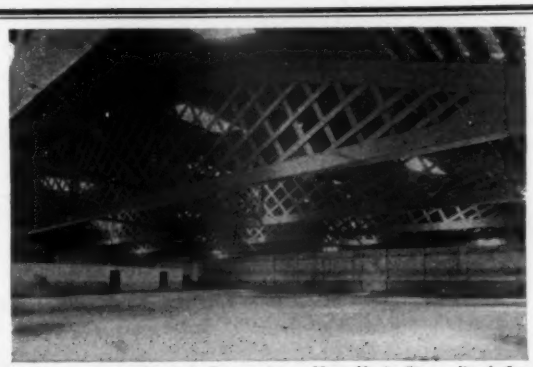

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it will eventually become a part. A knowledge of what is called "engineering economics" is becoming of increasing importance, especially since it seems that construction costs are seeking a stabilized level considerably above that to which most of us became accustomed during the five year period before the World War. This knowledge is not to be gained by those who wish for it unless they attempt to study the question from a broad knowledge of the factors that are fundamentally in control. There is hardly a building constructed but that there arises the question as to which of two or more materials or methods should be used in case the structural characteristics are on a level but the dollar price varies. A correct understanding of economic values can not fail to be of very great assistance where utilitarian motives govern; and it may act as a guide in those cases where esthetic value seems to be about equal to economic value.

The American Specification Institute has been organized to stimulate the acquisition of knowledge of engineering economics and to put into the hands of its members all known facts relating to the production of the materials that they deal with. Intimately connected with this study will be a program of discussion as to the best methods of erection and installation work to the end that structures, their equipment and embellishment, will be erected and installed in the best possible manner.

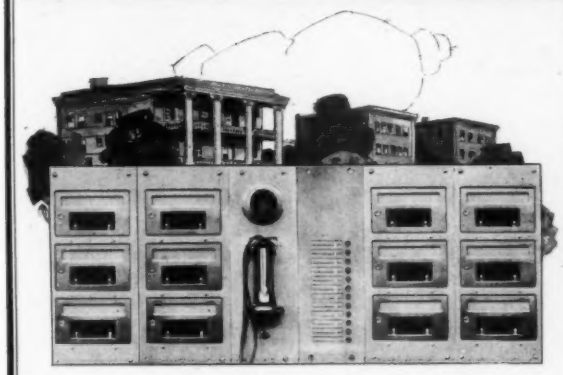
As stated in the "Plan and Scope" two of the activities of The American Specification Institute will be:

1. Study of materials in respect to
   - a—The production and physical properties of raw materials.
   - b—Methods of manufacturing, fabrication and finishing.
   - c—Relative value based on appearance, initial cost and maintenance, effect of combinations with other materials and proper materials for various types of buildings of varying grades.
2. What methods of construction and installation should be used.

IT is, of course, obvious that everyone can not inspect, personally, all plants that manufacture the thousand and one things that he specified and the average person will procrastinate if he is left to his own devices in acquiring the understanding of materials as he should have it. By means of frequent bulletins The American Specification Institute will place in the hands of its members either a complete resume or else a bibliography of available literature covering specific subjects, such for instance as paving bricks, which are mentioned in the editorial quoted. A comprehensive knowledge of materials and their most economic use in building construction will be accumulated from the experience of members each of whom, by his membership, has shown an intense interest in all those questions that must be met by a specification writer if his efforts are to be successful.

The architect or engineer who is responsible for the design and construction of a building or engineering structure must be intimately acquainted with a vast number of materials and processes and, as his knowledge of these and his skill in their use, increase he will find his objective more easy of accomplishment. The person who writes specifications for such structures must have a thorough knowledge of the subject matter of the various subdivisions of his specifications and since the average mortal can not hope to learn through personal experience all he must know in order that he may achieve success he must look to some source or sources of authoritative information for assistance. The American Specification Institute will render to its members every possible assistance in producing specifications of the best quality.

The work of The American Specification Institute is of vital interest to all members of all technical professional societies who are interested in construction work and its related activities. The restrictions that are placed on membership, namely that each candidate must be engaged, to some degree, in preparing specifications for building and engineering structures, their equipment, etc., assure a membership having a single purpose —the study and improvement of specifications— and, it is hoped, preclude the giving of attention to extraneous matters that might occur if the interests of the members were of a diverse character.



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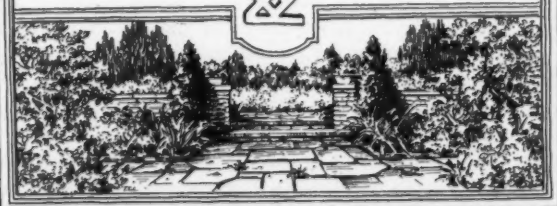

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PERSONALS

A. H. Hubbard, architect, is now located at 204 South Madison Avenue, La Grange, Ill.

It is announced that Charles Urbanek, architect, is now at 76 West Monroe Street, Chicago, Ill.

Charles S. Keefe, architect, wishes to announce the removal of his offices from 368 Lexington Avenue to 331 Madison Avenue, New York City.

John Reed Fugard and George A. Knapp, architects, announce their removal from 64 East Van Buren Street to 212 East Superior Street, Chicago, Ill.

Arthur D. Dean, who was formerly located at 403 Builders' Exchange, 614 Race Street, Cincinnati, Ohio, is now practicing his profession at 228 East Fifth Street, Montana Building, that city.

Announcement is made that Oppenhamer & Obel, architects and engineers, have opened an office for the practice of architecture and engineering at 408 Bellin Building, Green Bay, Wis. Manufacturers' catalogs and samples are desired.

Announcement is made that Lynn Fry has been appointed part time architect for the State of Michigan. Mr. Fry is associated with the Building and Grounds Department of the University of Wisconsin.

William Tallman, architect, formerly located at 218 North Main Street, Fairhaven, Mass., is now at 92 Green Street, that city. Mr. Tallman expects to leave for Europe for a year's travel and study about November 1st.

Announcement is made that Swirsky and Miller, architects, Herberich Building, Akron, Ohio, have dissolved partnership. Mr. Swirsky is now practicing under the firm name of F. Swirsky & Company, at the same address.

It is announced that Lund and Durham, architects and engineers of Minneapolis, Minn., have been appointed one of nine firms to serve as consulting architects and engineers to the National Tuberculosis Association.

C. W. Hopkinson was recently elected president of the Cleveland Chapter, American Institute of Architects. Other officers chosen were W. R. McCornack, vice president; William W. Sabin, secretary, and William Koehl, treasurer.

Funk and Wilcox Company, architects and engineers, Old South Building, Boston, Mass., wish to announce that they will be located at more extensive quarters at 26 Pemberton Square, Boston, on and after November 1st, and are desirous of receiving a complete line of manufacturers' samples and catalogs.

It is announced that Winsor Soule, John Frederick Murphy and T. Mitchell Hastings have formed a partnership for the practice of architecture in Santa Barbara, Cal. Mr. Soule has been a practitioner in that city for many years, the other two members of the firm being from the East.

F. E. Fowler, formerly of the firm of Fowler, Capelle & Troutman, architects, Evansville, Ind., is now directing architectural work for the Consolidated Realty and Theatres Corporation, 332 South Michigan Boulevard, Chicago, Ill. Manufacturers' samples and catalogs are desired.

William Cox, Bellingham, Wash., a pioneer architect of the extreme Northwest, has recently passed away. Mr. Cox first received his education in the profession of architecture in England. For some years, due to failure of his eyesight, Mr. Cox was forced to spend his life in comparative idleness. As a result of this, he was obliged to abandon work after the designing of the Elks' Home at Bellingham, one of his most creditable works.

Warren W. Day, of the architectural firm of Day and Bullard, Peoria, Ill., has again been honored by being appointed for the second time a member of the Public Action Committee of the Illinois Society of Architects. This committee, which has ten members, is made up of architects from Chicago, Moline, Bloomington, Springfield, Peoria and Rockford. Mr. Day will represent the interests of the local society and of the architects from this part of the state.

Announcement is made that K. G. Malmgren, for many years an architect in Spokane, Wash., has recently died. Mr. Malmgren first entered Eastern Washington as a draftsman in the firm of Cutter and Poetz. Upon the retirement of Mr. Poetz, Mr. Malmgren was admitted into the firm and the majority of early constructions in Spokane were designed by Cutter and Malmgren. A few years ago this firm was dissolved and Mr. Malmgren practiced alone until he took C. I. Carpenter into partnership, this partnership existing up to the time of Mr. Malmgren's death, which occurred in his fifty-eighth year.

XUM

FONTE MARCELLA, ASSISI, ITALY

Modern plumbing has not as yet fully invaded Italy. Still as in the generations past, the country people go to the wells in the piazzas for their water. These wells become the gathering place for the citizen and much time and thought have been spent on their design. Popes, leading citizens, and sometimes Kings have given to a city a decorative well as a mark of esteem. From the inscription, it is noted that this well was placed in Assisi by Pope Paul IV who ruled from 1555 to 1559. in honor of one Marcellus. (For measured drawings of this subject see pages 343 to 345.)